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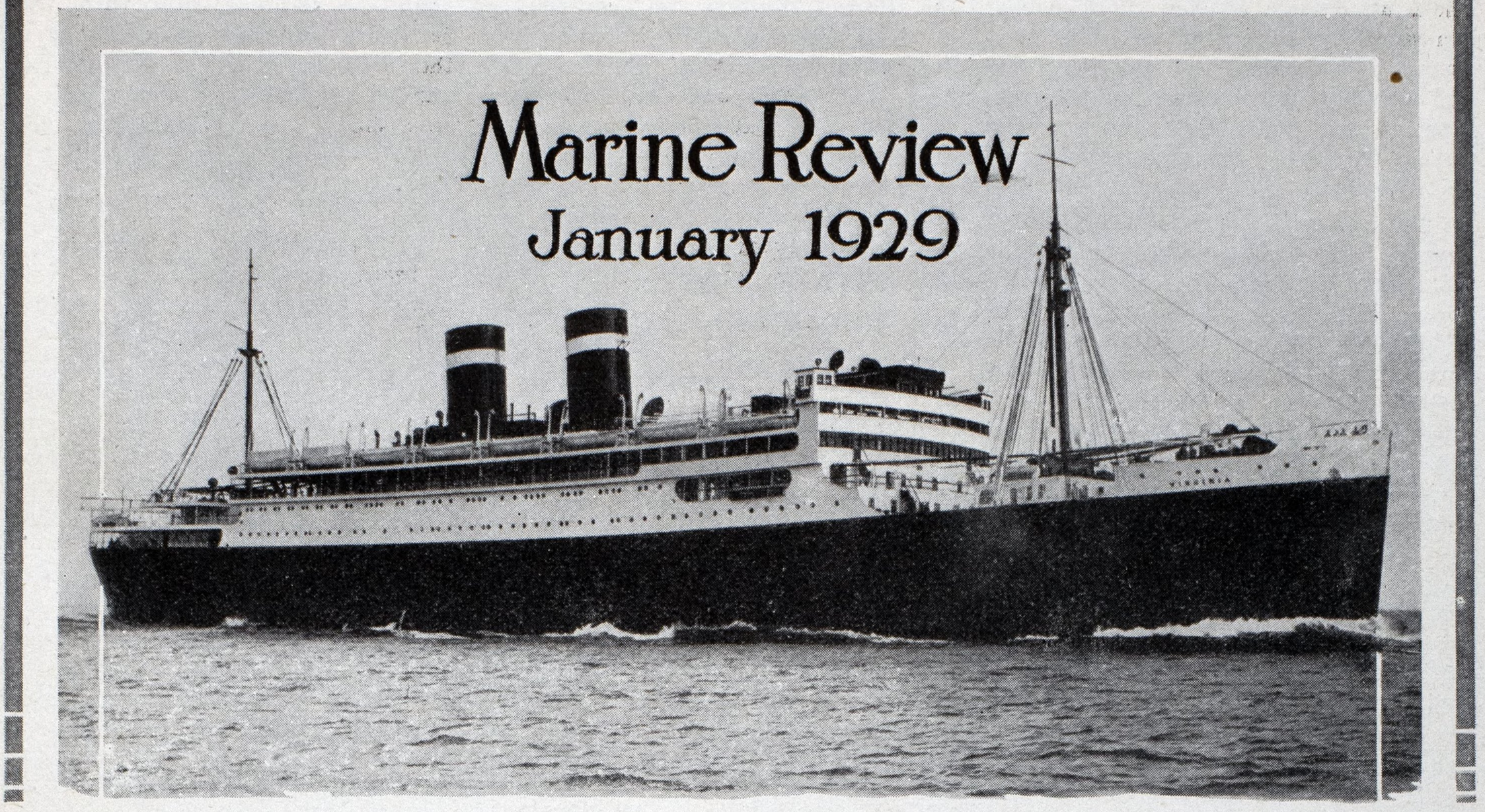
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Turbine Electric Liner Virginia, Largest American-Built Passenger Vessel, Sailed from New York on Maiden Voyage Dec. 8, 1928

Turbine Electric Liner Virginia Gives Low Fuel Consumption

By Herbert R. Simonds

WITH whistles blowing and tugs puffing the new Panama Pacific line turbine electric liner VIRGINIA sailed on Dec. 8 out of New York harbor bound for California on her maiden voyage. Many whistles are constantly blowing and vessels are constantly leaving the port so it is doubtful if many of the thousands busily at work in the skyscrapers in lower Manhattan even stopped to give the departing VIRGINIA a passing glance. Yet this was the largest liner ever built in America, and a triumph of American engineering genius. On Oct. 1, 1927 the CALIFORNIA slid down the ways at Newport News, Va., and entered the water as the largest American built steamship. Hardly were the ways clear before hundreds of workers were busy laying the keel of a new and larger vessel, the VIRGINIA. In many respects, these two are sister ships, and a third sister ship, a duplicate of the second, is now taking form in the space vacated by the VIRGINIA at the great yards of the Newport News Shipbuilding & Drydock Co., Newport News, Va.

On Nov. 19 last the VIRGINIA left the yards at Newport News and headed southward from Cape Henry for her builder's sea trial. This included a run of 21 miles to False Cape buoy, using only the port generator, and a return trip using only the starboard generator. No sooner home than she was again sent over the course for a test of full power from both generators. Although no attempt at record speed was made, she ran easily at 18 knots, without vibration, and in every way behaved perfectly as she was expected to and as her sister ship the CALIFORNIA, had behaved before her. The VIRGINIA was taken over by her owner the Panama Pacific line of the International Mercantile Marine Co. on Nov. 27 when she started on her first trip for the owner, from Newport News, Va. to New York.

Records taken during the owner's trial trip from Newport News to New York indicated a fuel oil consumption of 0.72-pound per shaft horsepower per hour as against 0.77-pound per shaft horsepower per hour for the CALIFORNIA. The VIRGINIA sailed from Newport News, Va. at noon on Nov. 27 and arrived in New York at 10 o'clock the next morning. Better time could have been

made but the vessel was purposely held up outside of New York harbor in order to calibrate the radio compass. During the trip a full speed run of over three hours was made reaching a rate of 19 knots and covering about 68 miles. The guaranteed speed is 18 knots.

More than 800 passengers crowded every berth in both classes as the VIRGINIA left on her maiden voyage from New York to California. An additional 380 persons, members of the crew, were required to operate the vessel, test new equipment and cater to the comfort of the passengers. Comfort of passengers is one of the important features of these new turbine electric driven vessels. Some of the items which are intended to further this comfort of passengers are all outside staterooms with beds instead of berths, two outdoor built-in swimming pools, private suites with private deck verandas and a profusion of electrical appliances and equipment. This latter includes apparatus for heating or cooling all parts of the ship.

The VIRGINIA is named after the state in which she was built and consistent with her American design and construction, the interior decoration and woodwork reflect the art of Colonial days. The lounge which is about 50 feet square has been given an added effect of spaciousness by the use of large casement windows, and a ceiling 13 feet high. As on the CALIFORNIA, the public rooms and passenger quarters of the VIRGINIA were designed by J. Philip Kiesecker in association with Barnet Phillips Co., New York. In this combination the Barnet Phillips Co. contributed its long experience in handling the decorative features of public buildings and clubs, and Mr. Kiesecker supplied the experience in marine architectural work. Not only were these associates responsible for all interior decorations, but also for the actual structural arrangements for the passenger quarters and public rooms. Mural paintings and decorations have been profusely used.

General Particulars of S. S. Virginia

Length over all, ft., in.	613–1¼
Length on water line, ft., in.	607
Length B.P.P., ft., in.	586–4
Beam molded, ft., in.	80–3
Depth to shelter deck, ft., in.	52–0
Load draft to bottom of bar keel ft., in.	33–9⅞
Camber, all decks in 80 feet	0–6
Gross tonnage	20,773
Displacement, tons	32,800
Deadweight capacity, tons	18,100
Capacity of fuel oil, tons	5,436
Maximum continuous S.H.P.	17,000
Normal speed in service, knots	17–18

Eight Babcock & Wilcox water tube boilers

Two General Electric main propulsion motors, one directly connected to each propeller shaft.

Two General Electric steam turbines each capable of developing 8,500 horsepower direct connected to alternating current generators.

Two propellers of three-blade type, 18 feet in diameter.

New Ventilating System

A feature of the VIRGINIA lounge is the new ventilating system. In addition to the normal supply of fresh air provided by the casement windows, electric fans have been concealed behind grills over each window. Each fan is provided with an independent air supply duct from the deck above. One of the most restful rooms of the vessel is the first cabin smoking room. This room is paneled in hard knotty pine, aged to give an antique effect and patterned after an interior in the Parson Capen house built at Topsfield, Mass., in 1676. On the walls of this room are four historic portraits in oil by Mrs. Carola Spaeth, Philadelphia.

The paneling in the dining room of the VIRGINIA is old ivory. The ports in the ship's sides of this room are concealed by leaded glass casements over which hang draperies in bright colored flowers and fruits. The chairs are Cuban mahogany upholstered in gray blue mohair. Illumination in this room is particularly effective. A flood of soft light issues from hidden lamps overhead, and from fixtures in the shape of tall old silver candelabra resting in niches along the paneled walls. Other rooms of interest include a library with built in book cases and easy chairs, a veranda cafe with wicker furniture and the entrance foyer of the first cabin on C deck which is paneled in straight grain oak and furnished with comfortable chairs and settees.

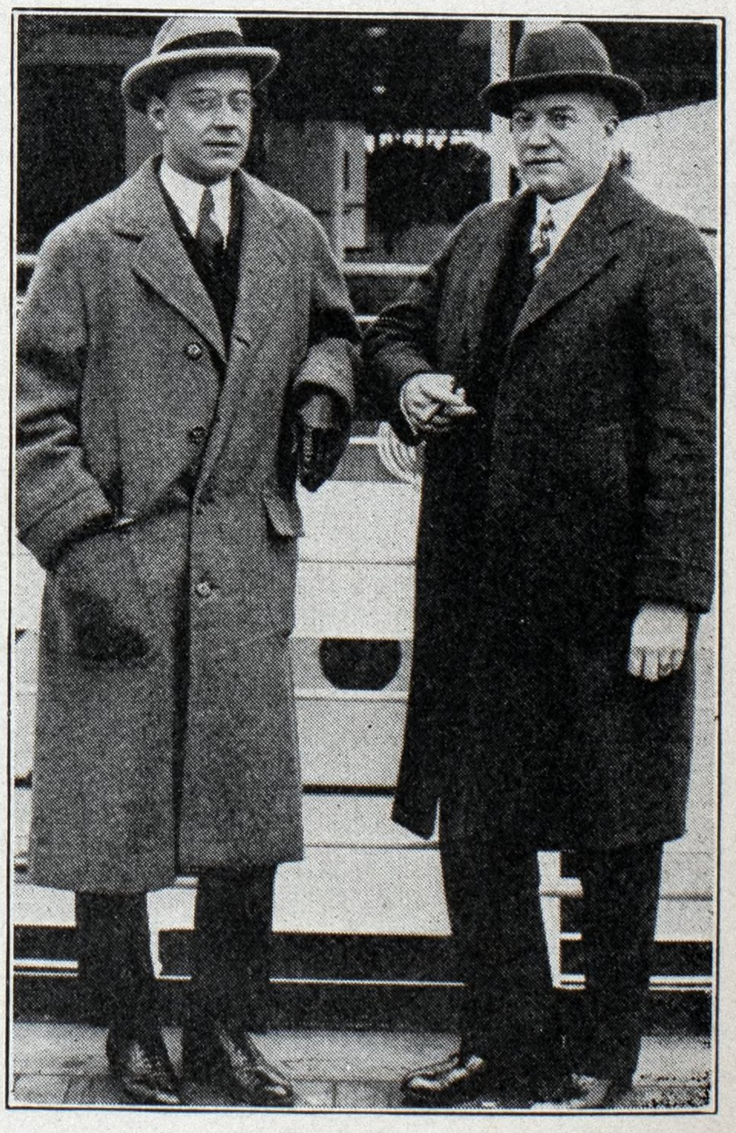
Strong Steel Construction

The VIRGINIA is 613 feet long, has a beam of 80 feet, displacement of 32,830 tons and a total depth of 100 feet from upper deck to keel. She has a capacity of 8500 tons in perishable and semiperishable freight. Her contract speed is 21¾ statute miles an hour, which will enable her to make the run of 5600 miles between New York and California in 13 days.

Each of the two propeller shafts of the VIRGINIA is driven by one electric motor which receives its energy from one of two steam turbine generators. The generators supply electrical current to the motors by means of electric cables and thus may be located at the most advantageous points in the vessel from the marine design standpoint. The control of each motor and its propeller is independent of the other, thus it is possible for quick turning and without the slightest chance of damage to reverse one motor and propeller while keeping the other motor and propeller in forward operation. In addition, the scheme of propulsion offers further flexibility in that either turbine generator can drive the ship in case of repairs on the other. The major electrical equipment has been supplied by the General Electric Co.

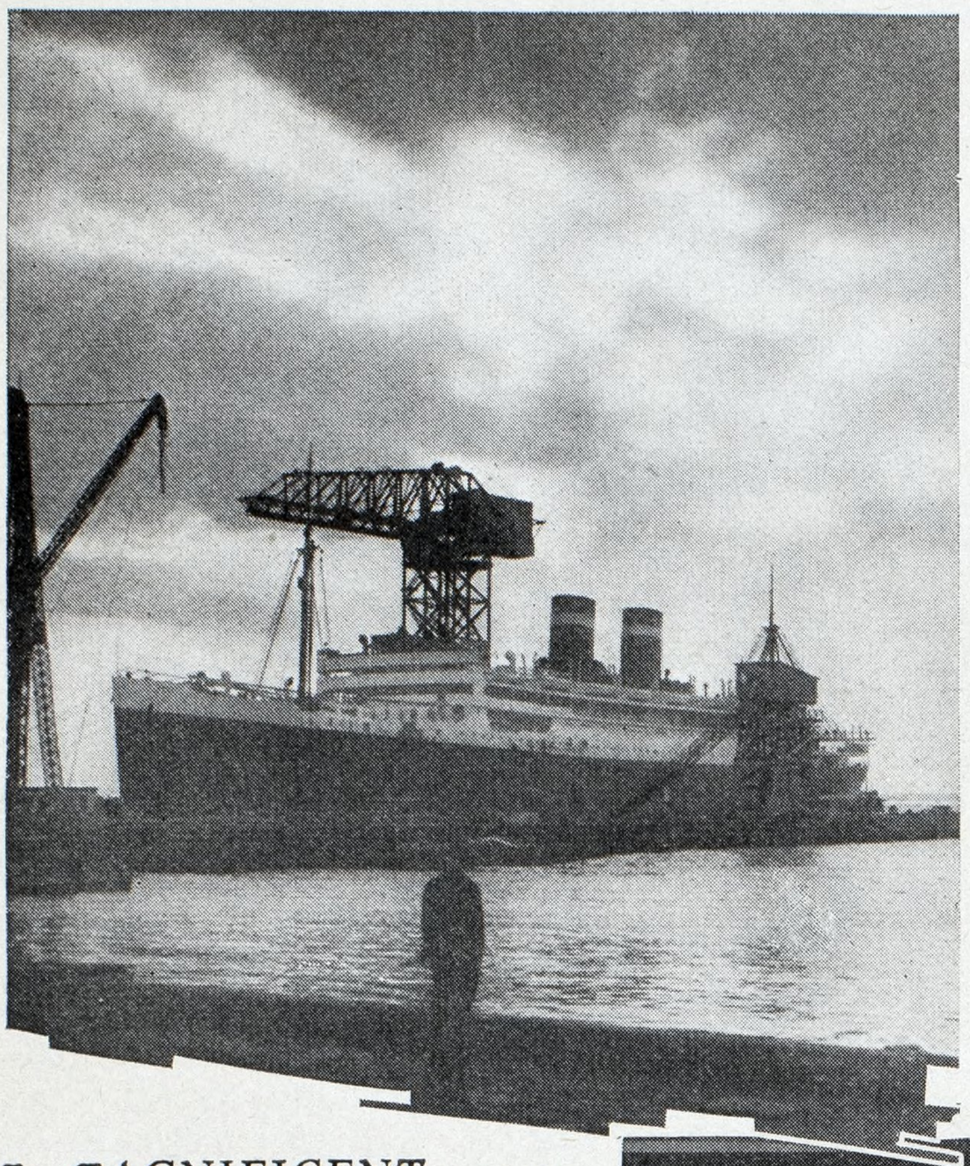


Left—A.J. McCarthy, Manager of I. M. M. Co. American Flag Ships. Right—H. W. Hoskier Traffic Manager Panama Pacific Line



Left—James S. Mahool, Passenger Traffic Manager I. M. M. Co. Right—Leo E. Archer, Pacific Coast Manager I. M. M. Co.

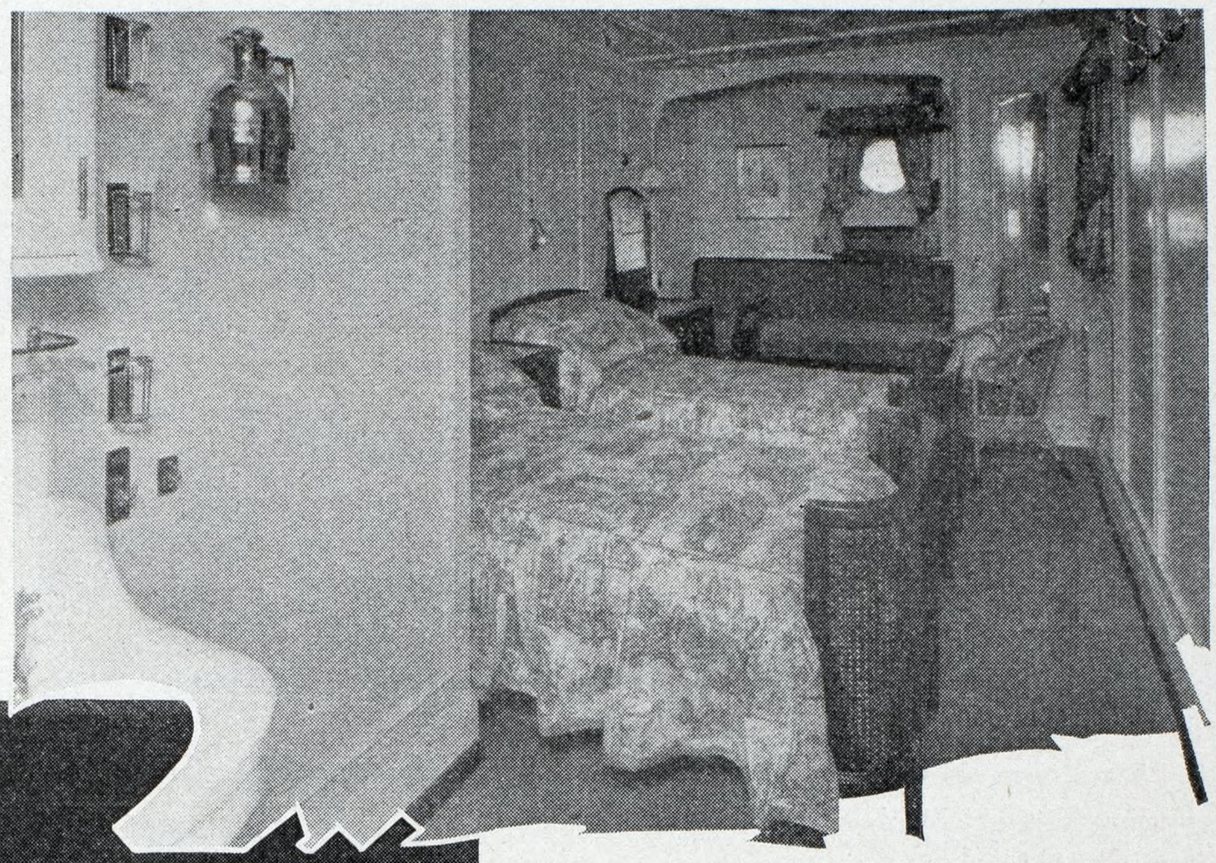
Passenger Quarters on S. S. Virginia

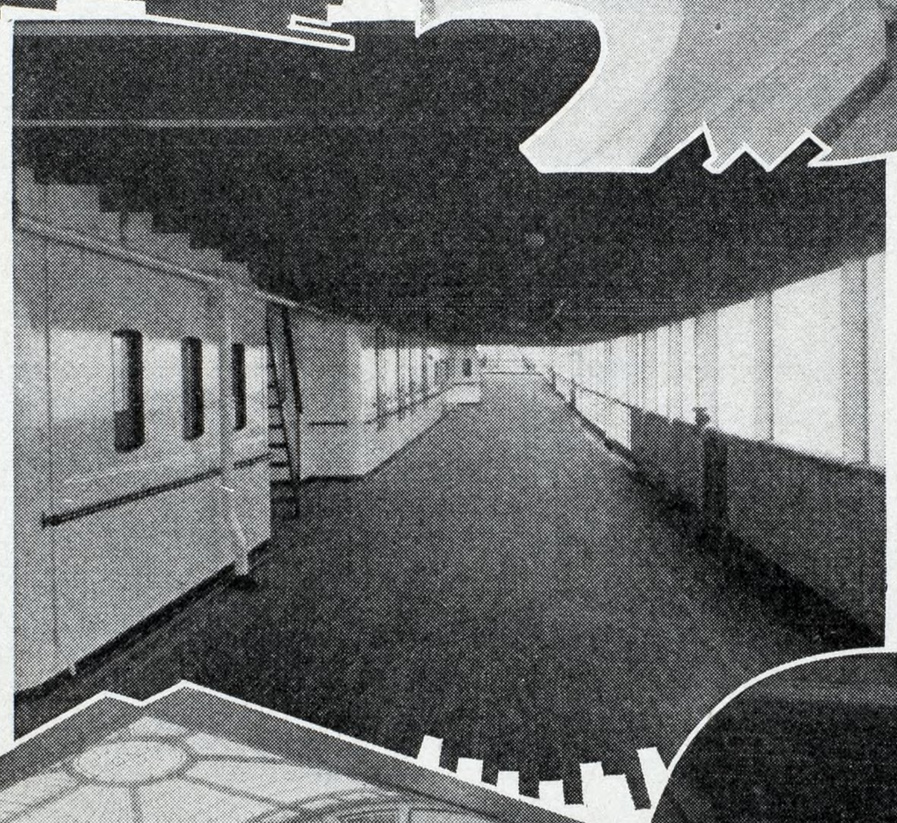


MAGNIFICENT new Turbine Electric Liner Virginia at the outfitting pier on the James River at the yard of the builder, the Newport News Shipbuilding & Dry Dock Co. shortly before her completion.

SPACIOUS promenade deck on the Virginia. Much of the time can be spent on deck during a considerable part of voyage.

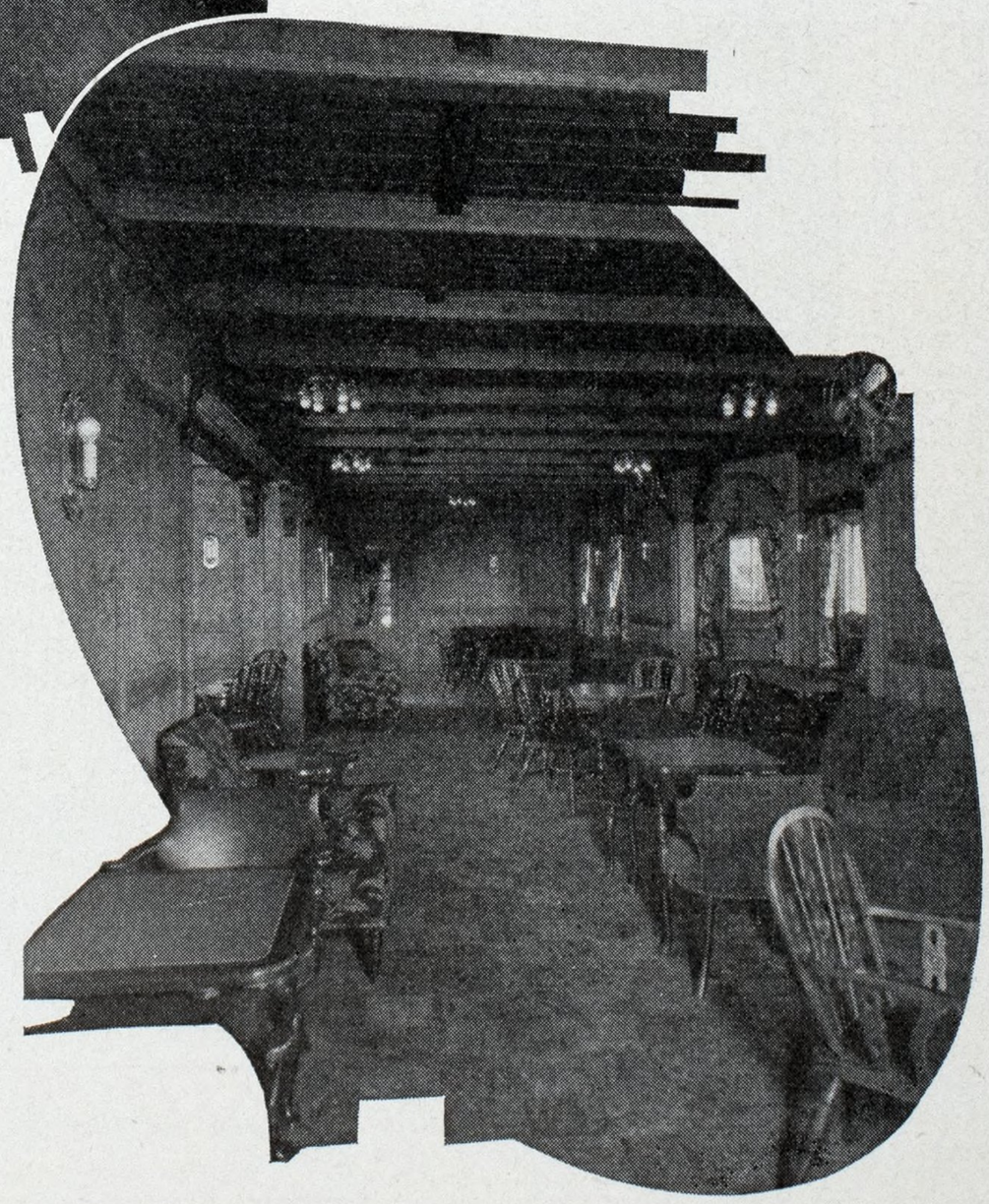
ONE of the de luxe first class staterooms on the Virginia. The furnishings including regular beds are of the finest quality and are simple and tasteful in design. The light effects are subdued and agreeable to the eye. Special ventilation is provided to offset the heat of the tropics. The passengers' comfort has been the first consideration.





FIRST class smoking room on the S. S. Virginia. Paneled in hard knotty pine, aged to give an antique effect. Patterned after the old New England home known as the Parson Capen house built at Topsfield, Mass., 1676.





FIRST Class Lounge on the Virginia looking forward. This room is 50 feet square and is fitted with large casement windows. It is equipped with electric fans fitted behind grills over each window for special ventilation.

and it is described in considerable detail in an article appearing in this issue by Frank V. Smith of the federal and marine department of that company.

Hull Subdivided for Safety

The VIRGINIA is built of steel, transversely framed, and has a raking stem and a cruiser stern. The weight of the steel entering into the construction of the vessel is in excess of 8500 tons or more than that required for many of the large New York skyscrapers. Twelve water tight bulkheads subdivide the hull, as a protection against flooding in case of accident. Further protection is provided by a cellular double bottom extending the full length of the vessel. All decks excepting the boat deck are steel plated. The general structural scheme of the hull consists of continuous plate and angle girders extending fore and aft under each deck. These girders are supported by rows of substantial tubular steel pillars.

The chief difference between the VIRGINIA and the CALIFORNIA aside from the 12 feet greater length of the VIRGINIA is a new design and arrangement of boilers supplying steam to the turbines. The CALIFORNIA had 12 water tube boilers. The VIRGINIA has eight Babcock & Wilcox marine water tube boilers operating at higher pressure than those of the CALIFORNIA and using higher superheat. The working pressure of the VIRGINIA boilers is 300 pounds per square inch, and they operate at 200 degrees Fahr. superheat. The total horsepower is the same as for the 12 boilers of the CALIFORNIA. The VIRGINIA installation has 48 Babcock & Wilcox Cuyama type burners. Sturtevant multivane fans furnish the air for these burners. Other equipment in the engine and boiler room is practically identical with that of the CALIFORNIA and includes Todd heaters, Griscom-Russell feed water filters, Davis feed water heaters, Worthington Pump & Machinery Corp. condensers, Warren centrifugal circulating pumps, Wheeler air ejectors.

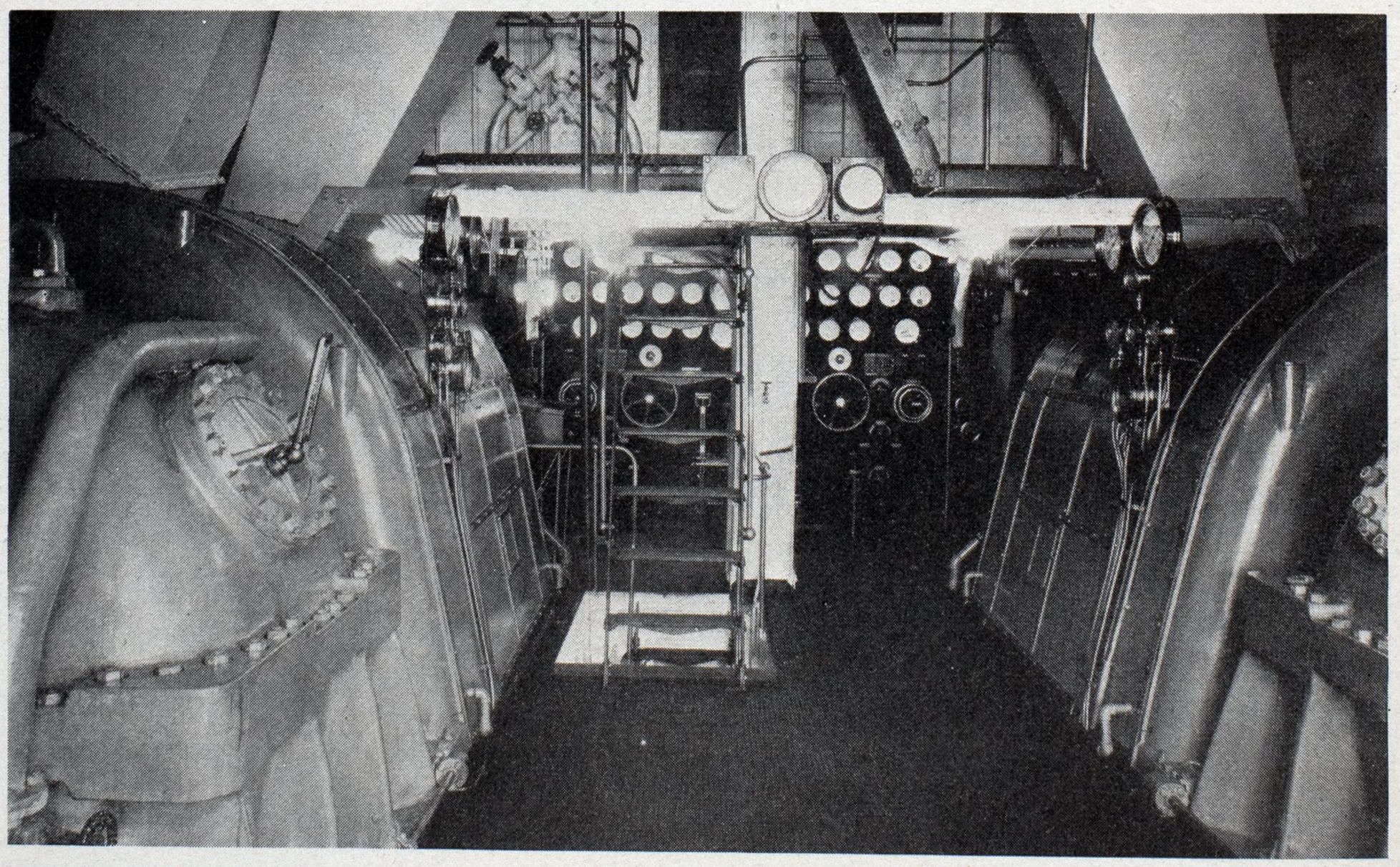
All of the auxiliary equipment of the VIRGINIA, which is extensive, is also similar to that of the CALIFORNIA which was fully described in MARINE REVIEW for February, 1928. Modern ship operation requires fast loading and unloading of freight, and as a result the material handling equipment of the VIRGINIA is elaborate and labor saving machinery is prominent. All of the VIRGINIA'S deck gear, except the windlass, is electrically driven. On the A and B decks there are 18 reversible single drum electric spur geared winches arranged in groups. Each winch is capable of handling 3000 pounds at 300 feet a minute. On E deck there are 13 of these winches. The cargo han-

(*Continued on Page* 56)

Virginia Shows Speed on Run to Havana

FAST time was made by the VIRGINIA *on the first leg of her maiden voyage from New York to San Francisco. She arrived at Havana on the morning of Dec.* 11. *On the evening of that day, A. J. McCarthy, manager of the International Mercantile Marine Co.'s American flag ships, who was on board, sent the following radio to P. A. S. Franklin head of the line, as follows:*

*"*VIRGINIA *makes remarkable run to Havana. Unusual speed made it necessary to slow down the last twelve hours. Liner shows general improvement over the* CALIFORNIA *in speed and fuel consumption. Passengers extremely happy at early arrival, now doing Havana gayly. Have been in constant wireless communication with New York, Los Angeles, San Francisco and Buenos Aires. Havana greatly pleased with second ship. Feels New York much closer. Government officials gave enthusiastic welcome."*



Engine Room of the S. S. Virginia Looking Forward—Main Turbine Generating Sets—Control Panel Board



General Electric Representatives on the S. S. Virginia During Her Trials. From Left to Right—W. G. Gardner, E. W. Van Brunt, D. L. Berkey, J. W. Upp, C. B. Keyes, W. B. Cordes, W. L. R. Emmet, D. W. Niven, John Thomas, C. K. West, J. C. Barry, C. W. Appleton, and M. C. Fitzgerald

Electric Drive Is Economical

Virginia, Second Electric Liner Sails—Betters Performance of California—Amazing Acceptance of This Type of Propulsion—Proves Advantages in Operation

By Frank V. Smith

A GREAT wave of modernization is sweeping the marine engineering field. Progress is so rapid we must seriously question the advisability of following long established standards. Take away electric auxiliaries and fuel rates jump 15 to 20 per cent; take away turbines and fuel rates jump 30 per cent; take away the oil-fired boiler and mechanical stoker and labor costs go up 10 per cent.

The all-electric passenger liner has come upon the scene during the past year, and it is establishing new standards of efficiency, comfort and convenience. When the International Mercantile Marine Co. decided to electrify its new Panama-Pacific fleet, it took one of those courageous steps, lacking in precedent, that so often prove to be a potent factor in changing the entire design standards of an industry, or of the thoughts and habits of a people.

When the S. S. CALIFORNIA was commissioned a year ago the maritime world was interested; when its economies and popularity became known, interest changed to action. Now we are experiencing one of the greatest upheavals in modern maritime history. We are just beginning to realize the full import of electricity—the uncanny power it has to multiply our labor forces—to usher us into a field where brain and not brawn are the requisites.

Electric Drive Becomes Popular

The keel is laid for the first 1000 foot passenger liner for the North Atlantic. It is to be electrically driven. The new electric passenger liner VICEROY OF INDIA is soon to go into service. The Grace line has ordered an all-electric passenger liner for its South American service. The Pere Marquette railroad has ordered two new car ferries of 7200 horsepower each for its Great Lakes service. New York and Norfolk are building electric ferries. This is just a fleeting glimpse and not the whole picture.

The airplane carriers SARATOGA and LEXINGTON have had their trials: on test the LEXINGTON developed 210,000 horsepower at the propeller shafts. This answers for a long time to come any question regarding power limitation on ships.

What has caused this new awakening? Let us examine the background. America for a long time has been busy modernizing its industries and putting into effect methods of mass production, giving the worker unlimited power to work with and increasing his productivity 60 to 100 per cent. With a great guiding vision the highest peak of industrial success in our history has been attained. America has become electric minded, and it is only natural therefore that the modern all-electric ship should be of American origin.

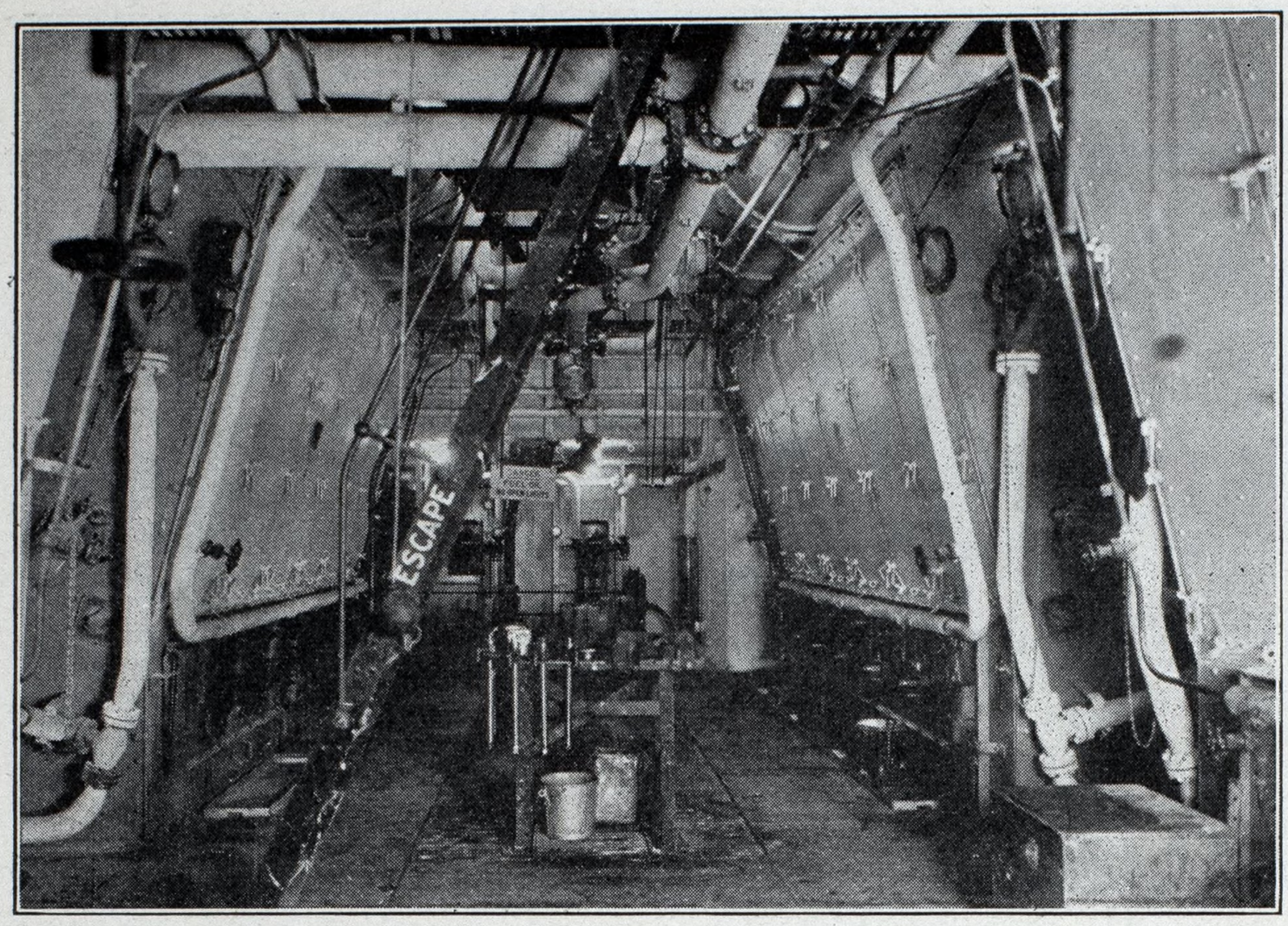
The same great modernizing influence that we have witnessed on land is entering the marine field and carrying with it a new humanism. No longer do we expect men to feed fiery furnaces by hand through the tropics—in the Indian Ocean—where often they go mad with heat and from the sulphurous fumes from which there is no escape. Electricity—the new power that can be directed at will! It will mine our ore, roll our steel, weld our ships, furnish us with light, fill the ether with music, drive our ships; it is a willing worker.

Use All Electric Equipment

The S. S. CALIFORNIA, and now the Virginia, have not stinted on electric power; they have applied it

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The author Frank V. Smith is a member of the staff of the Federal & Marine Department of the General Electric Co. This article was prepared for MARINE REVIEW at the request of the editor.



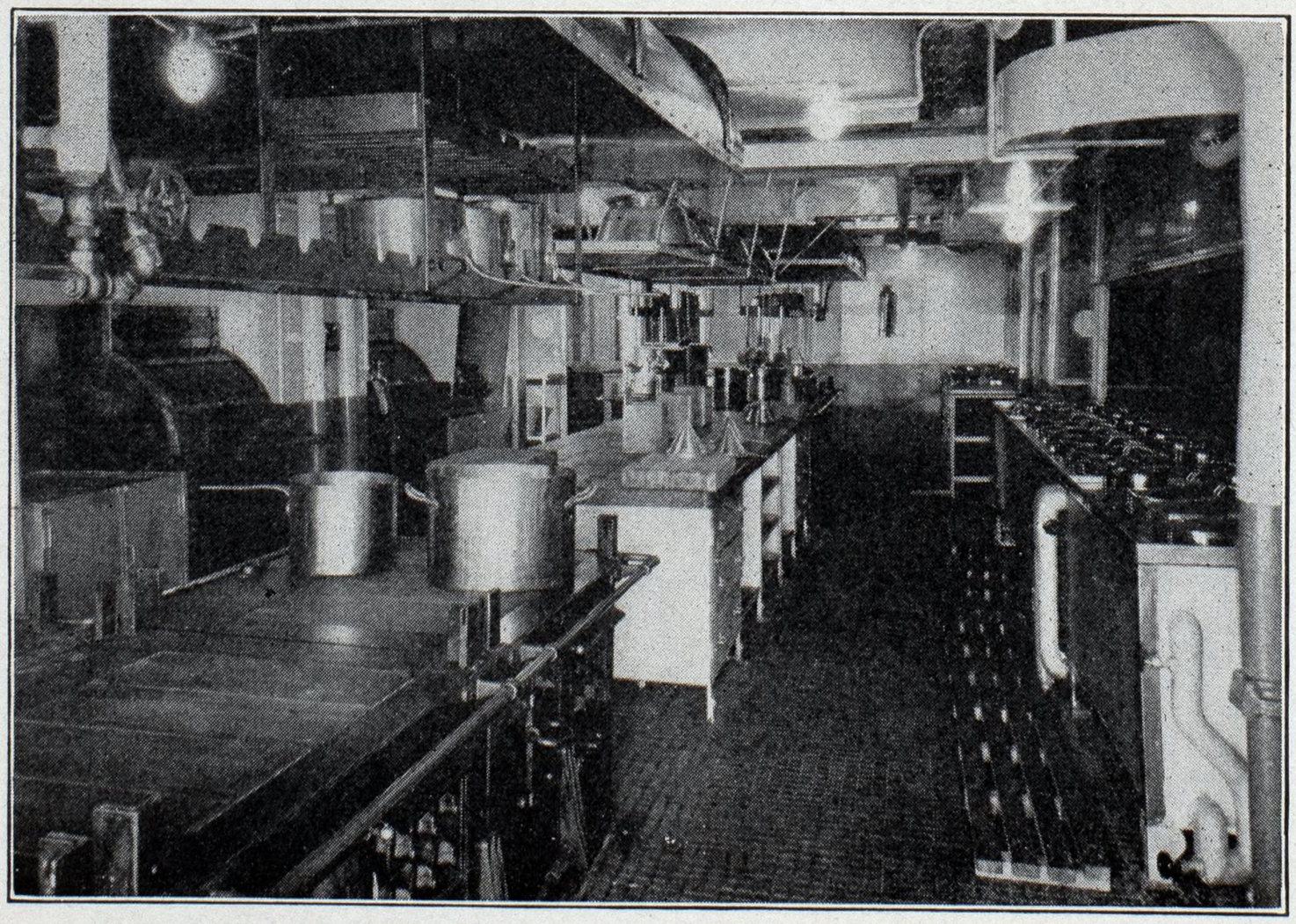
Boiler Room of the S. S. Virginia. Battery of Babcock & Wilcox Water Tube Boilers. Eight Boilers in All

wherever possible to add to the comfort and convenience of passengers. The owner has electrically heated and ventilated the staterooms, provided elevators for between deck service and filled the gymnasium with electric health giving apparatus. There has been no stinting where the workers on the ship can be relieved—electric ranges, bake ovens, potato peelers, bread cutters, toasters—all have been electrified.

The engine room and fire rooms have been electrified with a wealth of auxiliary apparatus that operates at the bidding of the engineers with but the turning of a switch. The electric cable has taken the place of the steam lines of old; the engine rooms are roomy, open and cool. In the fire-rooms the fuel is fed to the furnaces through small pipes and regulated by the adjustment of a valve; air is furnished to the furnaces by means of electrically-driven blowers.

On deck we find latest high-speed cargo winches that respond to the movement of a small lever without effort; electric boat hoists and electric capstans for warping the ship into dock. On the bridge, the helmsman of old has disappeared. The course is set and the ship electrically and automatically holds its course. Large electric motors drive pumps which supply liquid to hydraulic plungers which turn the rudder.

One hundred thousand cubic feet of space in the holds is given over to cold storage purposes for carrying California fruits eastward and bananas from the tropics. There are four large refrigerating compressors each driven by a 100-horsepower motor. In addition there are motor driven brine circulating pumps, cargo cooling fans and other miscellaneous auxiliaries for refrigerating purposes. Certainly these new all-electric passenger liners differ from our previous conceptions of ships. They are different, both from the standpoint of the traveling public and also of the operator.



Electrically Equipped Galley on the Turbine Electric Liner Virginia

No Noise or Vibration

The passengers are immediately impressed with the noiseless and vibrationless operation. They sense a new order of things—they wax enthusiastic and tell their friends of a wonderful voyage on a new kind of ship. The S. S. California in its one year of service has become a popular ship; it has been filled to capacity, and has had passages booked ahead for five months; it has popularized a trade route and brought into reality the joy of travel through tropical seas with visits to Panama and Havana while enroute.

For the engineering personnel, electricity has elevated their position; they feel a certain pride in being a part of the new regime. In the past it has been said that our American youth was not marine minded. This has been so only because he refused to work in competition with the cheapest labor from Oriental and southern European countries. Their mode of living, and their views on life were not his, and the stokehold was not his ideal. Electric machinery on ships opens a new vista. It provides supervisory jobs, where youth can receive a technical education and can grow and expand and be proud of its work.

The electric ship can be likened to many things. A paper recently read before the Society of Naval Architects and Marine Engineers had as its heading *The Central Power Station Goes to Sea.* This does not tell the whole story, however, for an electric ship consists of a great deal more than its power plant; a ship at sea must be self contained—it must not only be able to generate its power but it must distribute it. Ships at sea are living communities. Sewage and water systems are required—and lighting, heating, ventilation and refrigeration—plus power for driving the ship. There is not only the central station but also all of the distribution system that goes with a great city to make it habitable.

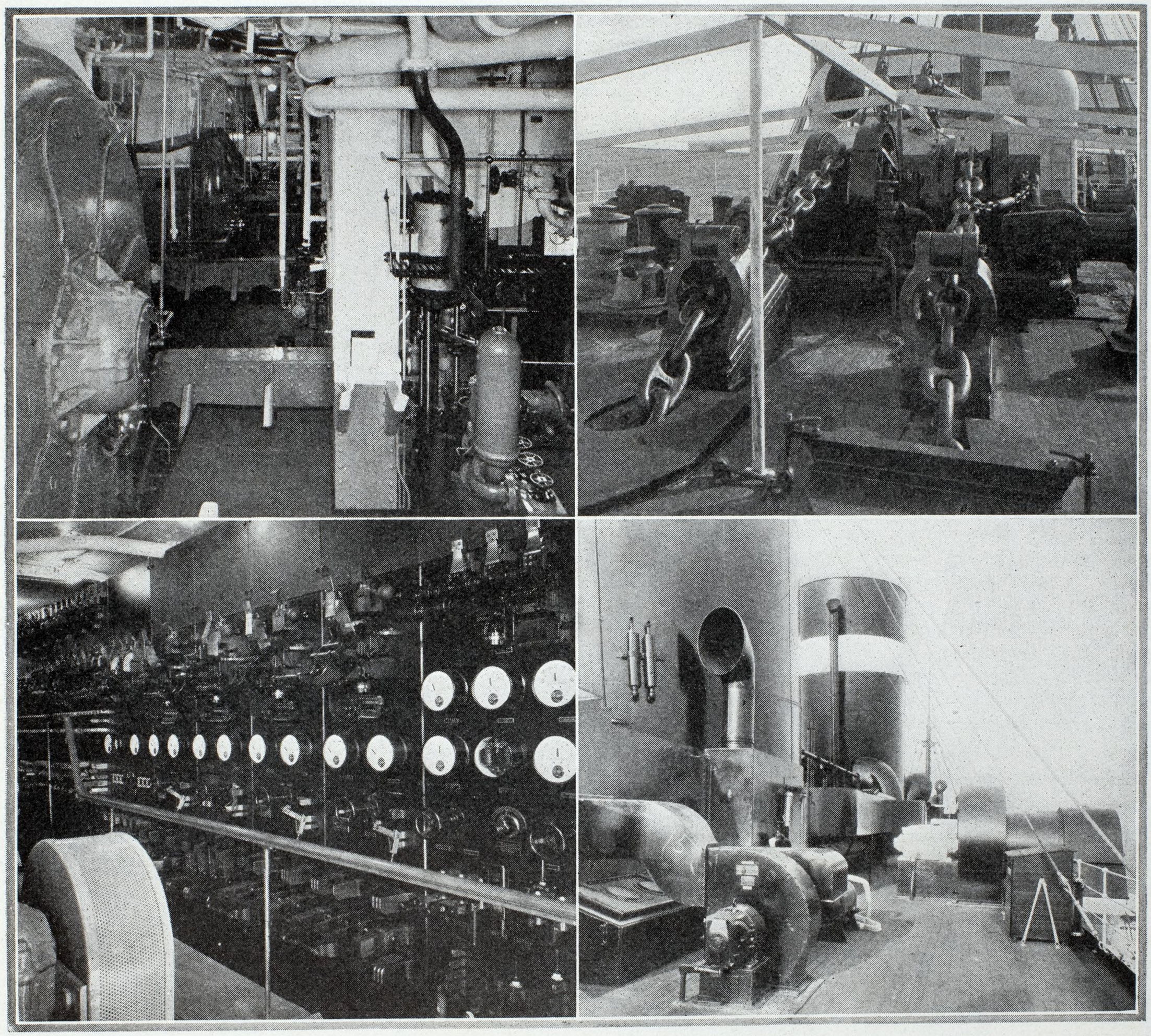
The S. S. VIRGINIA and S. S. CALIFORNIA from an electrical point of view are the same. The VIRGINIA,

however, is 613 feet long and has accommodations for 800 passengers, a slight increase over the CALIFORNIA. A new boiler arrangement was incorporated on the VIRGINIA and it has eight of the new Babcock & Wilcox inter-deck type boilers instead of 12 as installed on the CALIFORNIA. The initial steam conditions on the VIRGINIA have also been increased to 300 pounds gage pressure at the power maximum at the propeller shafts. In the builder's trials however the equipment was operated up to 21,000 horsepower with the greatest ease. On the run from Newport News, Va., to New York city, prior to making her maiden voyage, the VIRGINIA showed a fuel economy 10 per cent better than that on the CALIFORNIA. It is expected, however, that, when the ship has been in service for a short time and the crew has been thoroughly broken in, it will do even better.

The maneuvering of these new vessels is simplicity itself. Probably one of the best analogies that can be made is to compare it with an automobile: With an automobile we have a means of disconnecting the engine from the driving shaft without the necessity of stopping the engine, permitting us to change the connections for going ahead or reversing as desired. To accomplish this, two elements are required, a clutch and a transmission. On an electric ship the turbine is never stopped during maneuvering and it always operates in one direction. One lever, called the reversing lever, is used to change the electrical connections from "ahead" to "astern," and a field lever is used for taking off or applying the power as desired. By means of these two levers and a turbine speed lever, the ship is controlled.

A short electrical explanation will show how easy this is of accomplishment. The main generators, which are of the alternating-current type, consist essentially of a revolving field and an armature. Now if a current is

(*Continued on Page* 56)



Upper Left—Engine Room of the Virginia Looking from Starboard to Port—Propulsion Motor at Left. Upper Right—Anchor Chains and Windlass Looking Aft. Lower Left—Panel Board for Main Power and for Lighting. Lower Right—Deck Equipment of the Virginia. Blowers for Ventilating Systems

boilers and 200 degrees Fahr. superheat, to increase further the fuel economies. In connection with the main propelling equipment a totally enclosed ventilating system for the main generators and motors was installed, similar to that found in the newer type of central station ashore.

The main propelling equipment, which is of the turbine-electric type, has the nominal rating of 17,000 horse-

Welland Canal to Open in 1930

Great Ship Canal Connecting Lakes Erie and Ontario— Depth Over Sills, 30 Feet—Usable Length of Locks 820 Feet

SATISFACTORY progress has been made during the past year in completing the new Welland ship canal, across the Niagara peninsula, connecting Lake Erie at Port Colborne with Lake Ontario at Port Weller. It is located about ten miles west of Niagara Falls. The difference in level between the two lakes is 326½ feet. The new canal is entirely within Canadian territory and the work is being paid for and carried out by the Canadian government through its department of railways and canals. Word has been received from Alex. J. Grant, engineer in charge, that the canal will be open from lake to lake sometime in 1930 if everything goes well.

Build Second Welland Canal

The Welland canal is one of the principal links in the great chain of navigation extending from the Straits of Belle Isle up the St. Lawrence river and through the Great Lakes to Duluth at the western end of Lake Superior, a distance of 2339 miles. The first canal connecting the two lakes was built as a private enterprise by the Welland Canal Co. under the leadership of William Hamilton Merritt and was completed in 1829. It had 40 wooden locks, each 110 feet long, 22 feet wide with 8 feet depth of water on the sills. It was connected by a feeder canal to the Grand river and later was extended from Port Robinson to Port Colborne on Lake Erie; the latter section being opened to navigation in 1833. This canal was 27½ miles long from lake to lake.

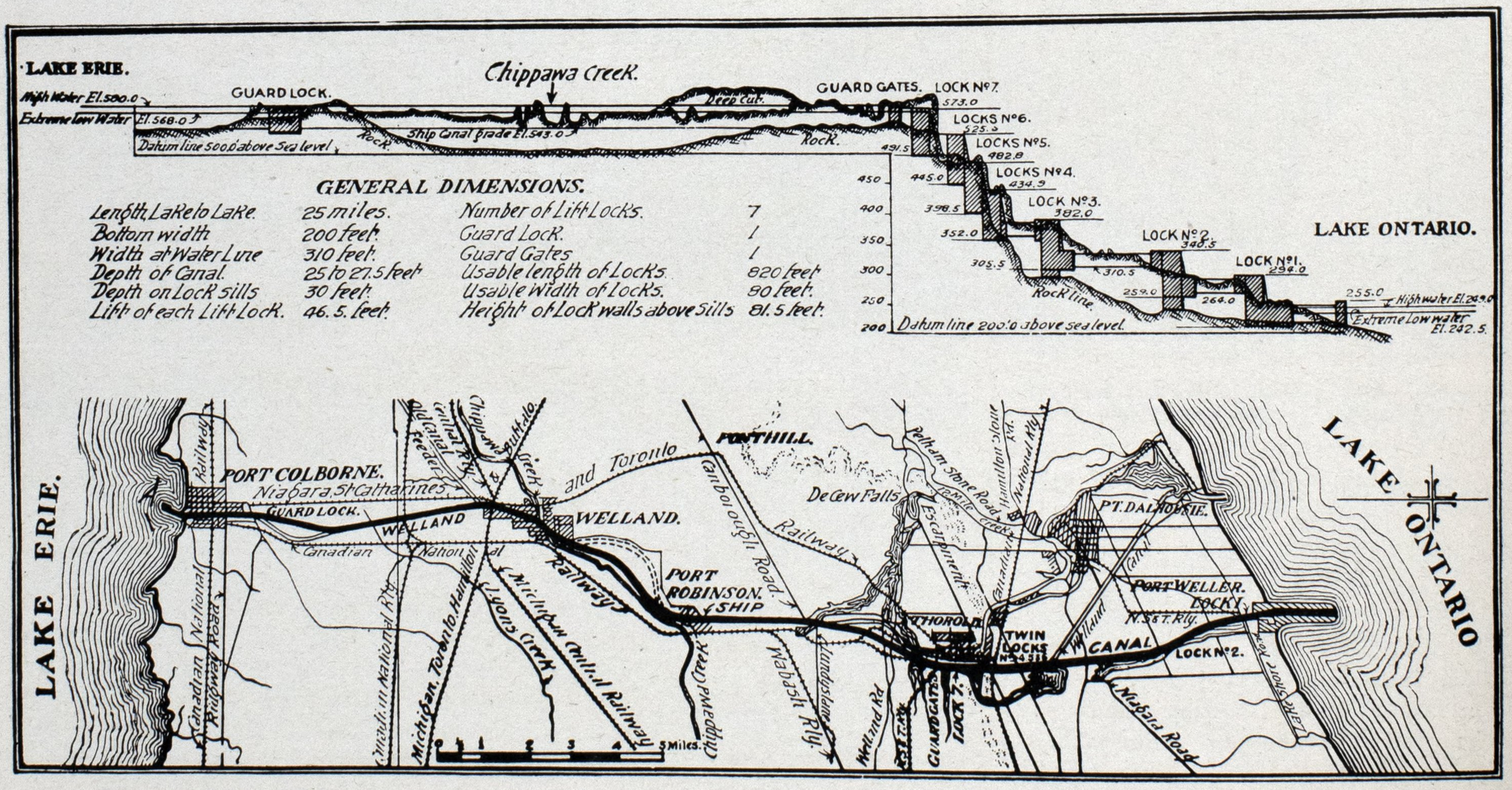
In 1841 the original Welland canal was purchased by the Canadian government and arrangements were made to enlarge it for 9-foot navigation and also to complete the St. Lawrence canals between Lake Ontario and Montreal. The original 40 wooden locks were, by increasing the lifts, reduced to 27 locks which were built of cut stone, each 153 feet long, 26½ feet wide with 9 feet depth on the sills.

A commission appointed by the Dominion government recommended in 1870 a uniform scale of navigation for the St. Lawrence route and a Welland canal with locks 270 feet long, 45 feet wide and 12 feet of water on the sills. This later was increased to 14 feet. The work of enlarging this third Welland canal was carried on to these dimensions. Its locks are built of cut stone with lifts of 12 to 14 feet. It is carried over the Chippawa creek at Welland by a cut stone aqueduct. This third canal, 26¾ miles long was opened to traffic for 14-foot navigation in 1887, and the St. Lawrence river canals in 1901; when the Northwestern Steamship Co. of Chicago placed a fleet of four steamers of 2000 tons capacity in commission between Chicago and Europe. A number of times the boats were loaded to slightly over the 14 foot limit.

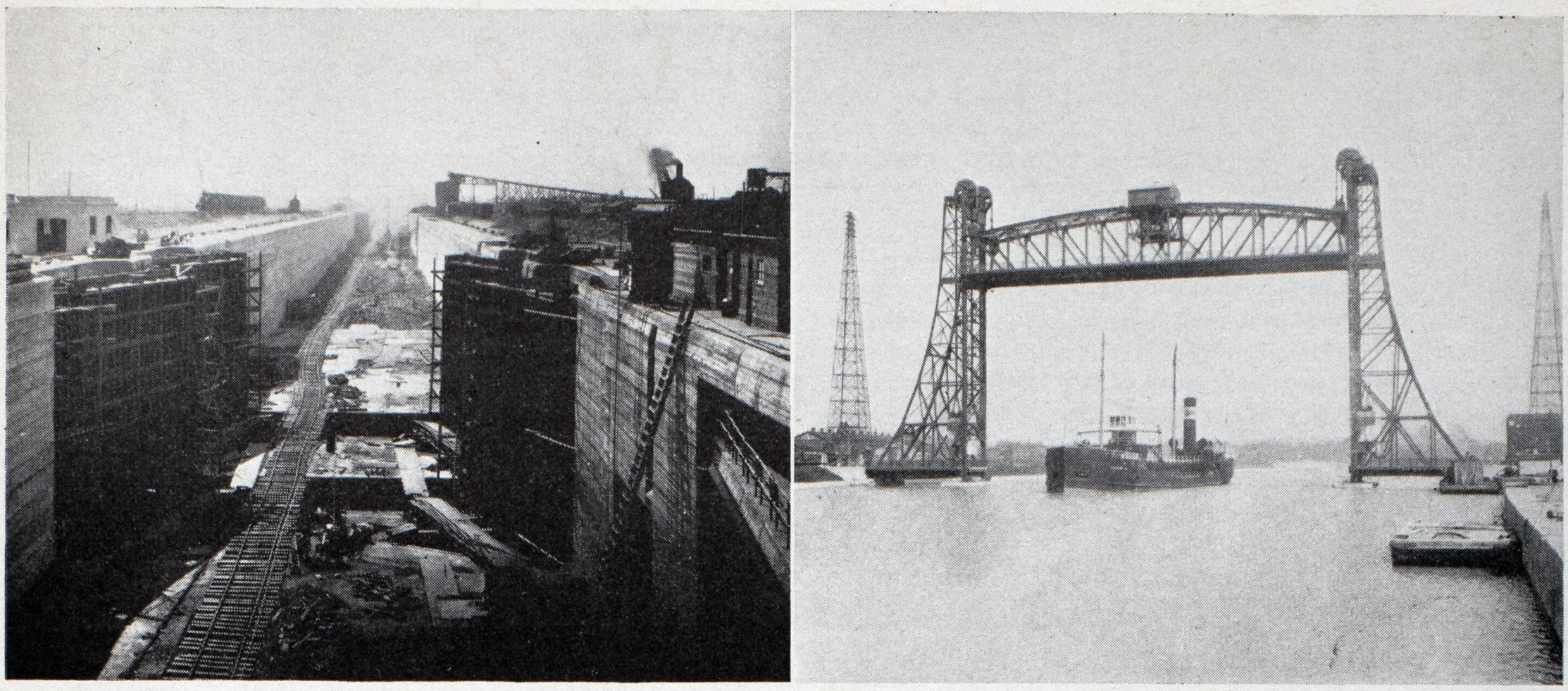
New Canal Will be Fourth

Growth of tonnage passing through the Welland canal has been enormous. In 1901 it was only about 620,000 tons; in 1914 it had increased to 3,860,000 tons. Since then except for the war years, traffic has grown rapidly year by year with a new maximum annual tonnage record of 5,640,298 tons established in 1925. The short-sighted policy of 1870 left the canal as much out of date in 1887 as it was when the improvements were begun in 1873. For many years, therefore, serious thought has been given to the improvement of the Welland and St. Lawrence canals to such dimensions that ships of at least 25-foot draft could pass through. Thus came about the fourth Welland canal now nearing completion. Work on this great project commenced in 1913.

This fourth and real ship canal



ELEVATION AND PLAN OF NEW WELLAND SHIP CANAL. USABLE LENGTH OF LOCKS 820 FEET, WIDTH 80 FEET



WELLAND SHIP CANAL. LEFT—LOCK NO. 8 LOOKING SOUTH FROM BRIDGE NO. 19. LOCK GATES BEING INSTALLED. AUG. 29, 1928. RIGHT—BRIDGE NO. 14 IN OPEN POSITION LOOKING NORTH, AUG. 28, 1928

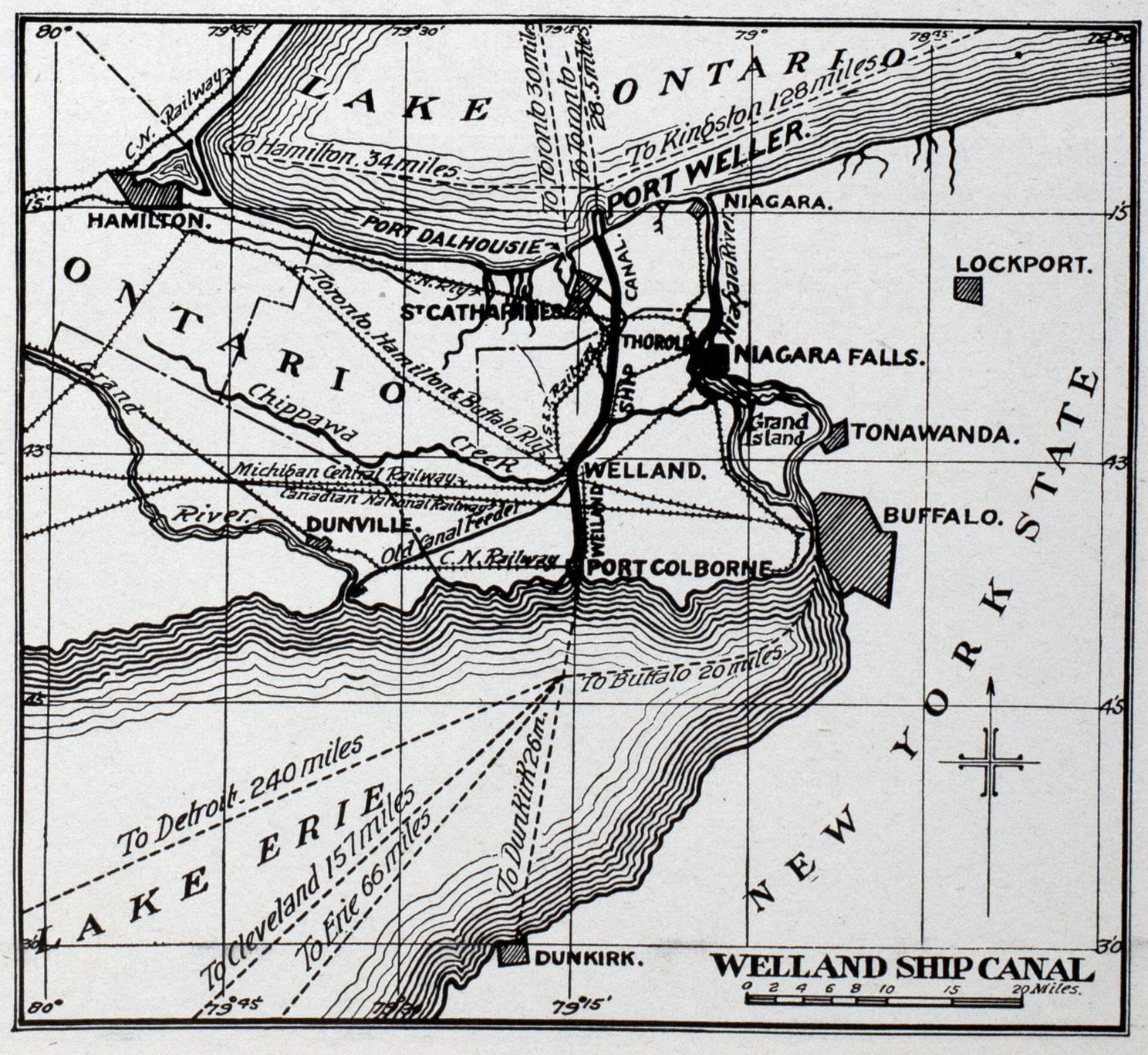
has a usable length of locks of 820 feet and a usable width of 80 feet. Depth of water over the sills is 30 feet and the navigable depth minimum to begin with is 25 feet. The new canal follows the valley of the Ten Mile creek between Port Weller on Lake Ontario and Thorold, crossing the present canal below lock eleven, where the water level of both canals will be at an elevation of 382 feet above mean sea level. The ship canal again crosses the present canal below lock twenty-five where the water levels of the two will again coincide at an elevation of 568 feet. Between Thorold and Allanburg a new cut has been made in order to straighten the alignment between these points. From Allanburg to Port Robinson the present canal and the ship canal alignments coincide and in this section the ship canal is now completed to a bottom width of 200 feet with a permissible draft of 25 feet.

Canal Has Straighter Course

From Port Robinson to Welland the ship canal taking a straighter and more direct course lies to the east of the present canal following closely the west bank of the Chippawa creek. From Welland to Humberstone the present and ship canal again coincide. North of Humberstone the ship canal leaves the present canal and continues a straight alignment into the harbor of Port Colborne on Lake Erie and thus eliminating a sharp curve in the present canal known as Ramey's Bend.

In order to regulate the summit level of the canal from Port Colborne to Thorold to 569 feet where there is a guard lock No. 8 at Humberstone through which the vessels will be passed from the constantly fluctuating level of Lake Erie to the regulated summit level extending north to Thorold. The total length of the ship canal is 25 miles, or 27.7 miles between the outermost ends of the harbors of Port Weller on Lake Ontario and Port Colborne on Lake Erie. For all practical purposes of navigation the new canal is a straight line from beginning to end. The difference between the levels of the two lakes is taken care of by seven locks of 46½ feet lift each. The excavated depth of a portion of the canal will be 25 feet and in other sections 27½ feet. All permanent structures, however, are being built for a 30-foot draft so that the canal at any future date can be deepened by simply dredging out the canal prisms and the harbor entrances. Both Port Weller and Port Colborne harbors have been dredged to an average depth of 27½ feet below standard low water level.

It is interesting to note that the estimated time for a vessel to be



LINE OF THE NEW WELLAND CANAL BETWEEN LAKES ERIE AND ONTARIO

lifted the 326½ feet difference in levels between Lake Ontario and Lake Erie and to cover a distance of 25 miles is 8 hours. There are 21 railway and highway bridges across the canal. The greatest height of lock wall, between locks No. 4 and No. 5, is 130.8 feet. The estimated weight of metal in a lock gate with fixed parts and machinery is 23,000 tons.

Excellent progress in completing the canal has been made during the 1928 season. The appropriation for the past year amounted to $13,750,000 of which amount nearly $10,000,000 has been expended by the end of November. The total net expenditure on the ship canal up to Oct. 31, 1928 was approximately $98,750,000 which is about 85 per cent of the total estimated cost of the canal. During 1928 construction operations have been carried on throughout practically the whole length of the canal.

A summary in detail of the exact progress of the work in various sections of the canal is not necessary for the purposes of this article. However, certain outstanding features may be mentioned. For instance the new harbor at Port Weller on Lake Ontario together with locks, 1, 2, and 3 and their connecting reaches are entirely completed and the lock structures are being outfitted with their operating equipment. The great massive steel service gates for these locks are completed and at lock No. 1 these gates have already been equipped with their operating machinery. Four highway bridges cross the ship canal in way of sections 1 and 2. Three of these are completed and the fourth will be completed in 1929.

Use High Pressure Boilers on Liner

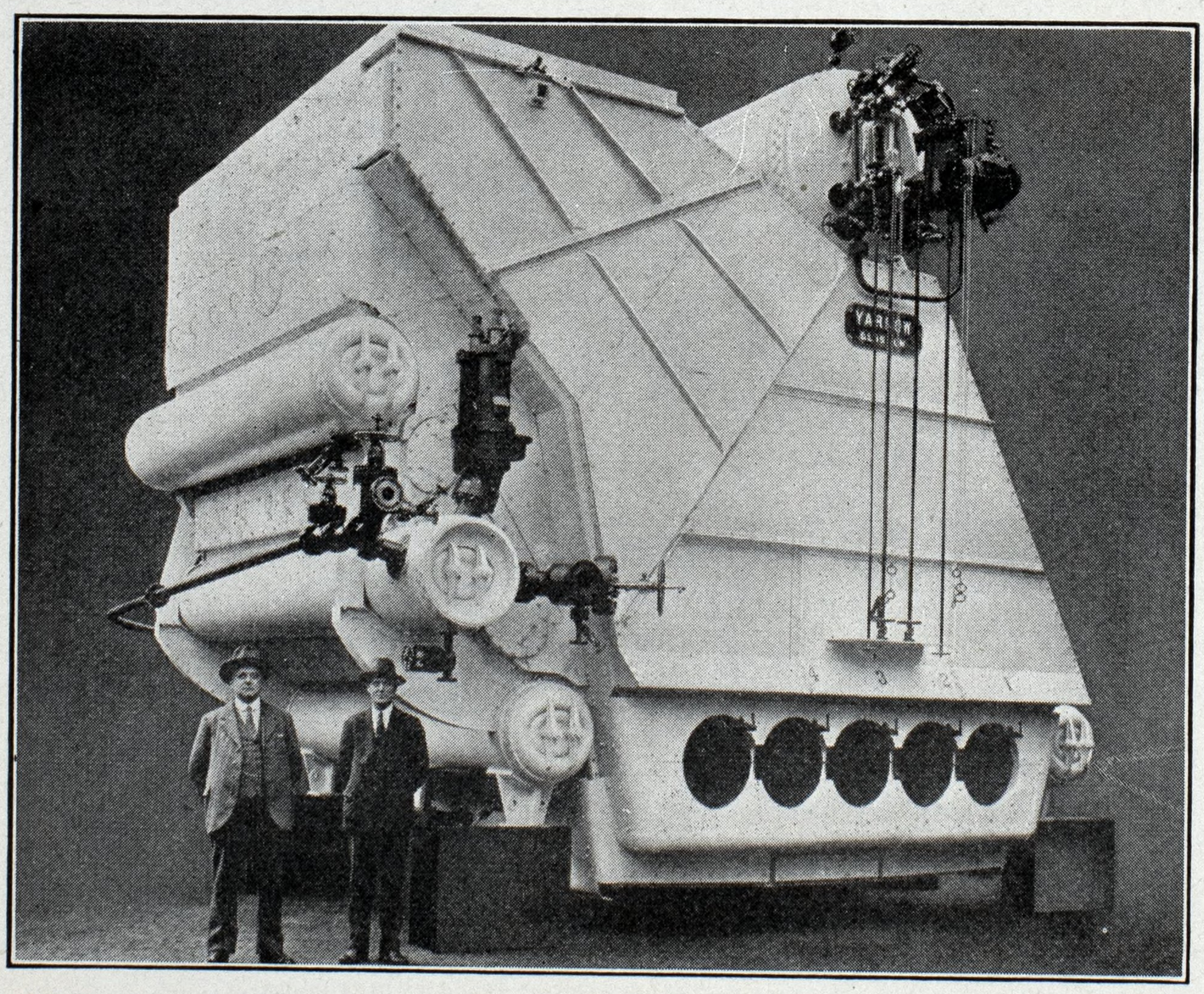
ONE of the interesting features of the turbine electric liner, VICEROY OF INDIA, building for the Peninsular and Oriental Navigation Co., at the yard of Alexander Stephens & Son Ltd., Linthouse, England, launched Sept. 15, and now about completed, is her boilers. This vessel will be propelled at a speed of 19 knots by twin screws driven by two electric motors totaling 18,000 shaft horsepower. Steam turbine electric generators take high pressure steam from Yarrow watertube boilers burning oil fuel. The overall dimensions of the VICEROY OF INDIA are: Length, 610 feet; beam, 80 feet; and depth to the upper of her nine decks, 82 feet. Her tonnage is over 19,000 tons and the displacement is approximately 25,000 tons.

She is unique in that she has 415 separate cabins for 415 passengers. Communication is possible between cabins by sliding doors where required. Her stability has been carefully considered and it is anticipated that she will be very steady.

The accompanying illustration shows one of the six Yarrow boilers fitted in this vessel. Steam is supplied at 350 pounds pressure and 700 degrees Fahr. The boilers are situated in two separate stokeholds. Four are placed in the aft stokehold forming a watertight compartment, and are of sufficient capacity to enable the forward stokehold to be entirely shut down when the vessel is steaming at 16½ knots. In addition to the Yarrow boilers there are also two cylindrical boilers in the forward stokehold for supplying steam in port if needed in addition to power furnished by the two diesel engine generators which have been installed for harbor purposes.

The air required for forced draft is supplied by six electrically driven fans, the motors being of the Austin constant current type, giving a large speed variation. The boilers are arranged for oil fuel firing on the Clyde oil fuel system made by the builder of the ship. The entire oil fuel plant, including pumping and heating units, transfer pumps and filters, is placed in two separate pump rooms situated between the forward and aft stokeholds. All oil fuel pumps are electrically operated. About 2300 tons of oil fuel can be carried in 22 tanks surrounding the boiler compartments, the tanks being filled from a central station on each side of the ship, and the quantity of oil in each tank may be measured at any time by means of a special mercurial gage.

Feed water for the boilers is supplied by two Weir turbo feed pumps, and any loss of feed water is made up from fresh water in the double bottom tanks, which is purified by being evaporated in a low pressure evaporator. The feed arrangements are designed on the Weir closed feed system and the feed heating is in three stages, there being one surface heater on the discharge side of the water extracting pumps and two surface heaters, one intermediate pressure and one high pressure, on the discharge side of the turbo feed pumps. Steam for the heaters is bled from the main turbine and exhaust from the feed pump, and the feed temperature will be about 300 degrees Fahr.



ONE OF SIX YARROW WATERTUBE BOILERS ON ELECTRIC LINER VICEROY OF INDIA

Keeping a Damaged Ship Afloat

Stop Water Inrush with Waterproof Mat or Curtain Outside Shell —Mat to be Accurately Adjusted and Securely Held in Place

By Tobias Miller

WHENEVER a major disaster at sea occurs it serves as a stimulus for safety proposals more or less thought out and more or less practicable. In the first hysteria following heavy loss of life in the sinking of a ship it is only natural that there should be exceptional pressure brought to bear on the government agencies for compelling vessel owners to equip their ships with a thousand and one varieties of aids to safety. It is not in that spirit that this proposal is made. It is put forth instead as a suggestion which may be accepted by practical men for what it is worth.

Simplicity and order on deck in and around the prescribed life saving equipment will increase the possibility of getting the life boats overboard. Without interfering with this simplicity it is proposed to make use in an immediate and practical way of collision mats or curtains in a somewhat different way from that now used by salvage vessels, vessels of the navy, etc., as first aid in temporarily keeping out the inrush of the sea through accidental openings in the hull. The novelty of this proposal lies in the suggestion that one or more properly designed mats or curtains be carried on every ship for use in an emergency; also that there be arranged ways and means for applying such a mat over the damaged area on the outside of the hull. The proposed ship saving device consists of a large mat of canvas, oakum and other waterproof material. When in use it may be suspended by ropes attached to rollers which run on a track. A tentative sketch of the arrangement is shown in the accompanying illustration. The track may run along the ship's side. The track and rollers are for sliding the mat into the exact position of the leak. When not in use the mat may be rolled up like a carpet or curtain and stowed away in a container which may be readily opened, or it may be suspended from the track while rolled up. When it is discovered that water is coming into the vessel the location of the leak must be determined. Then a guide rope weighted with an iron ball is suspended from the prow of the stern of the ship and its end is carried to the other side opposite the location of the curtain. The guide rope is lowered under the keel and at the right moment the mat is pulled into position in way of the damaged area. The mat is then unrolled and is lowered into the water, its lower edge being weighted and reinforced with an iron bar. This iron bar serves as a stiffening of the curtain in bridging over the hole, preventing the water pressure from causing its collapse. With the mat in position the ropes on the opposite side of the ship are pulled as taut as necessary and suitably secured.

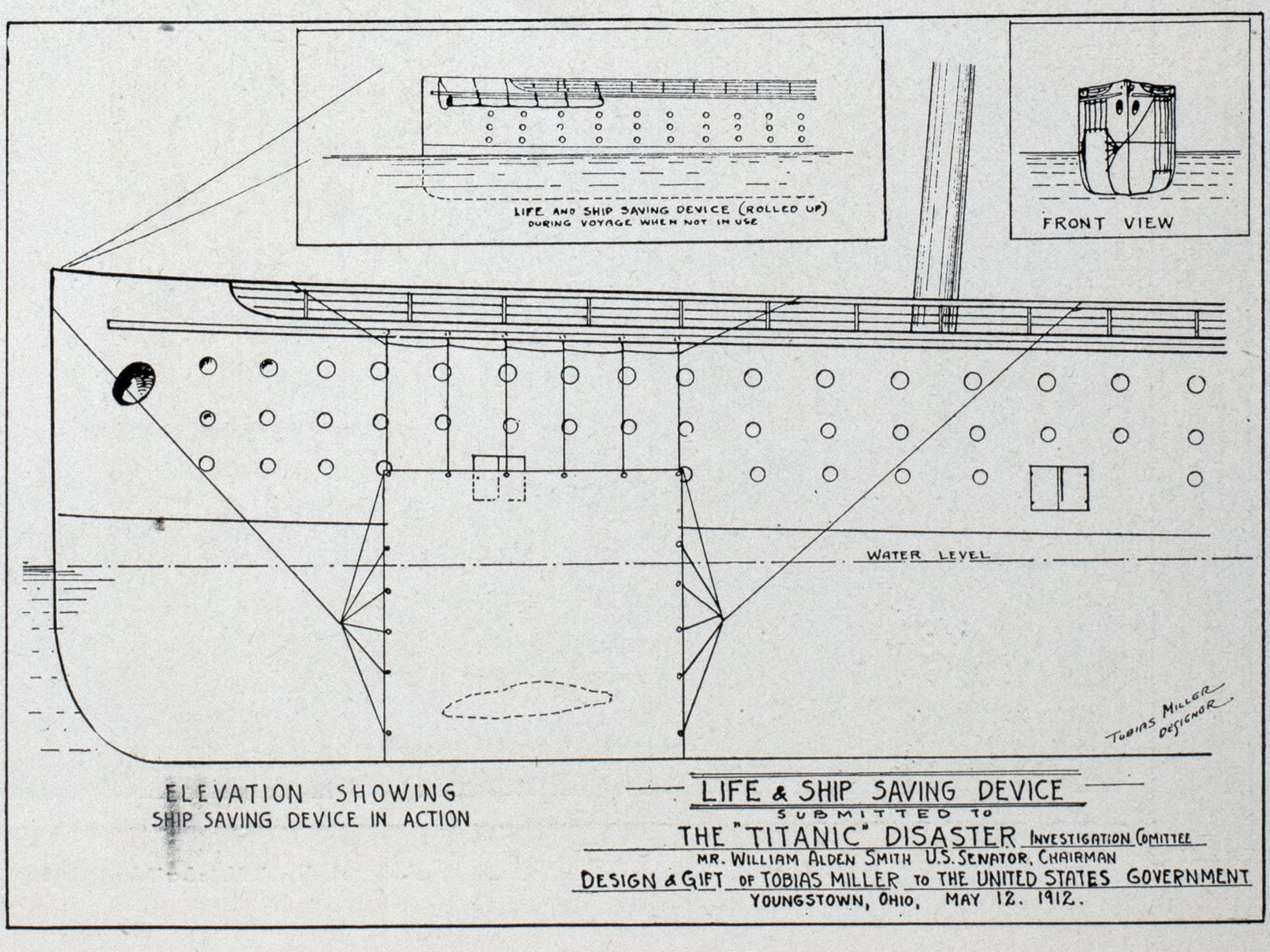
This forms the first aid bandage so to speak and the pressure from the water on this bandage tending to force it through the opening is actually employed to seal up the leak tightly. Temporary repairs may then proceed.

On long ships it may be that several of these curtains or mats could be located at more or less regular intervals. In that case it is suggested that each curtain be provided with a guide rope which can be carried along the railing toward the nearer end of the ship. When a damaged area is large two or more of the mats may be used overlapping in width or depth as the case may be.

The device described here should be nominal in cost and its practical development as possibly one of the greatest first aids to a ship in time of disaster surely merits serious consideration by experienced engineers.

When First Suggested

THE author, Tobias Miller, an engineer residing at 10009 Madison avenue, Cleveland, first suggested the method described and illustrated here to the United States Senate committee for investigating the TITANIC *disaster on May 12, 1912, presenting it at that time as a gift to the United States government. No acknowledgement was ever made of the receipt or disposition of the matter. On inquiry by the author it later developed that the sketches and brief specifications had disappeared. The recent disastrous loss of the* VESTRIS *recalled to mind this interesting proposal and it is presented now for the first time publicly in the hope that it may lead to an entirely workable and practicable first aid in increasing the chances of succor for passengers and personnel and even to save the ship itself in an emergency of this nature.*



Diesel Electric Freighter Sails on Maiden Voyage to Far East

SUCCESS in the competitive business of shipping by water is today dependent upon modern efficient machinery. Fifteen years ago speed in a freighter was considered unimportant. Now it is realized that speed is an economy, for speed means quicker turnover and this in turn means lower overhead.

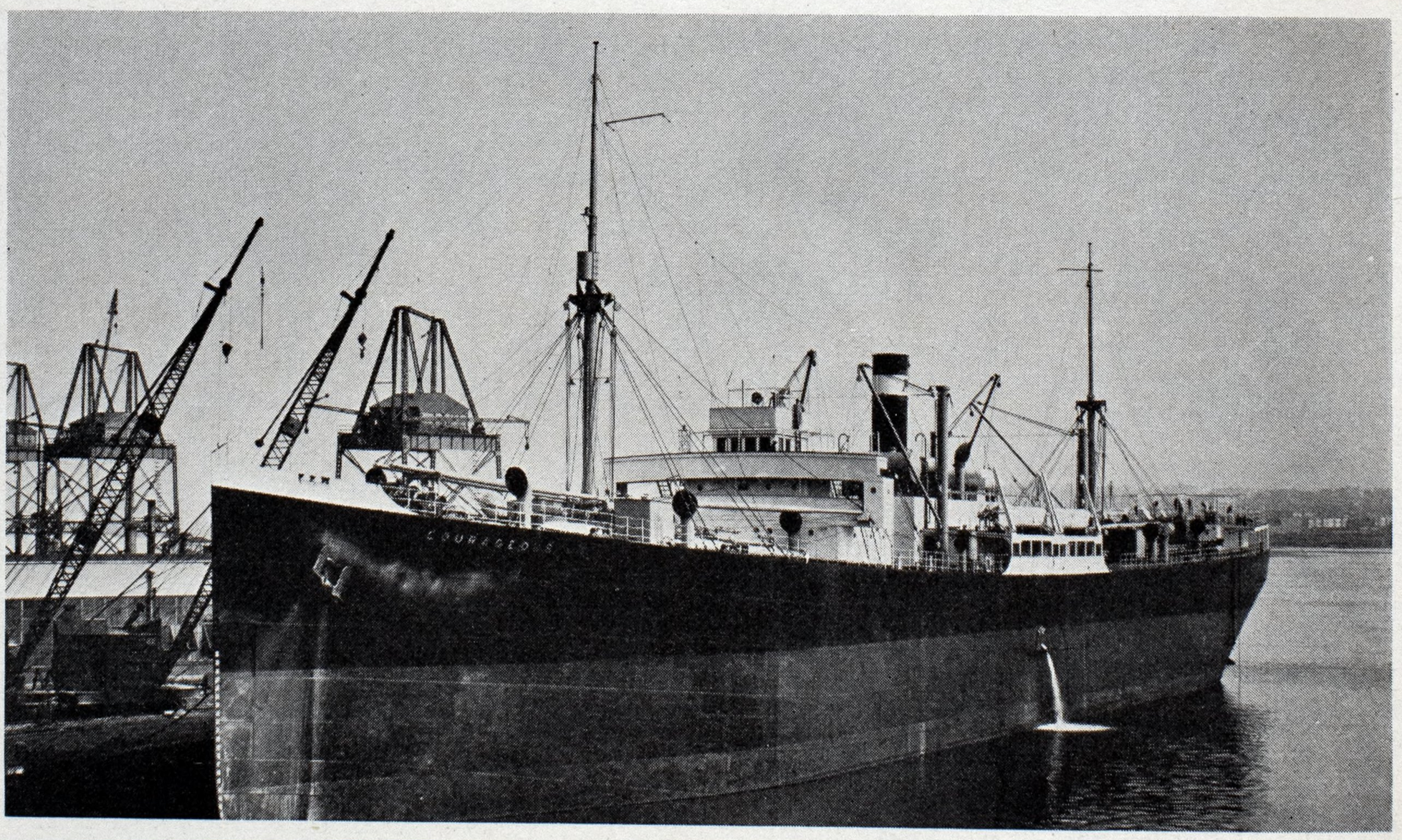
The diesel electric freighter COURAGEOUS, recently sailed on her maiden trip after conversion to modern propulsion equipment. She now makes a speed of 13 knots, whereas before the conversion she had a speed of 9½ knots. This is an increase of over 36 per cent in speed which means that if the slower vessel made two round trips to the Far East a year this faster ship should make two and a half. It is too early yet to get any direct figures on increased mileage. The Roosevelt Steamship Co., operating the COURAGEOUS, has nine ships in its Far East service, and by converting all of them to the speed of the COURAGEOUS, the company could maintain its present monthly sailing schedule and at the same time reduce its fleet in that service to seven ships. If this is accomplished, it will mean a direct saving in operating expense of two ships, and of course a saving in investment to correspond.

Courageous Particulars

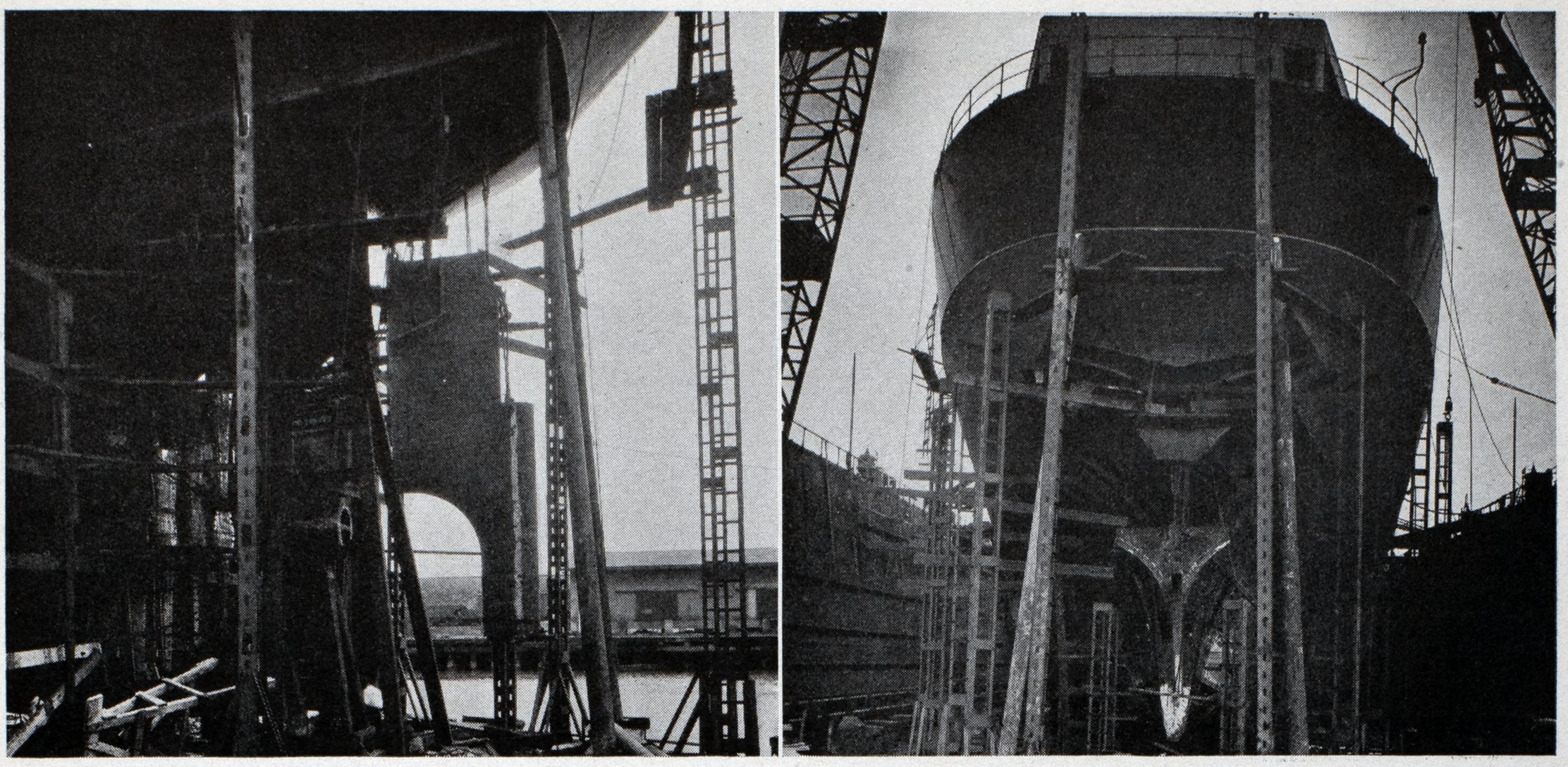
	Before	Now
Length—O.A., ft., in.	457–6	468–6
Length—B.P.P., ft., in.	440–1½	457–4½
Breadth—molded, ft., in.	56–0	56–0
Depth—molded, ft., in.	38–0	38–0
Displacement tons	15,946	15,140
Cargo capacity, cu. ft.	577,992	577,992
Cargo capacity, tons	9,400	9,128
Bunker capacity (including deep tank in steamer), tons	2,138	1,159
Fresh water capacity, tons	235	213
Deadweight capacity (including fuel, water and stores) tons	11,773	10,500
Horsepower (main engines)	2,645	4,000
Speed, knots	9½	13

If the COURAGEOUS is able to make two and one half trips to the Far East a year now with her modern machinery, as against two trips before conversion, it will mean that she has an increased earning capacity of 25 per cent on the assumption that she carries the same class of cargo. However, a faster vessel is able to secure higher class freight at greater revenue, and therefore her earning capacity may be expected to be considerably in excess of that indicated by the increase in number of trips. If the increased earnings of the COURAGEOUS are even as much as $75,000 a year they will represent a good return on the conversion investment which was $1,319,000.

The increased speed of the COURAGEOUS has been secured by alteration of the shape of the hull at bow and stern and by the use of diesel electric drive. She is the latest vessel to undergo the modernizing process under the direction of the shipping board, and she is one of the largest dieselized freighters in service. The story of her change is entirely unlike that of the other freighters converted to diesel direct drive. Here we have a vessel approximately 458 feet long with a speed between 9 and 10 knots under steam power, changed to an overall length of 468



Diesel Electric Freighter Courageous at the Dock of the Federal Shipbuilding & Dry Dock Co., Kearny, N. J.

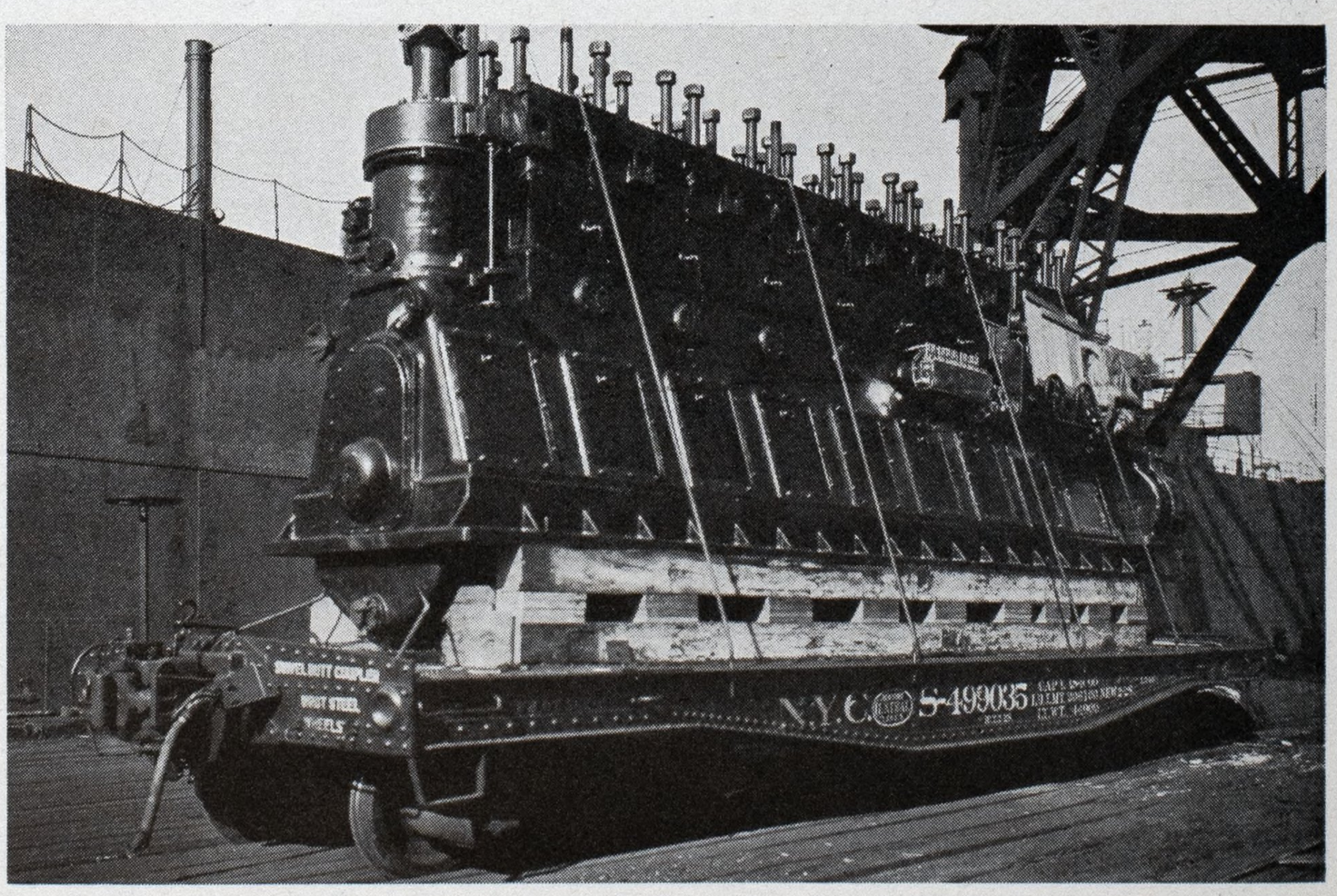


IN DRYDOCK AT THE FEDERAL SHIPYARD, KEARNY, N. J.—MAJOR ALTERATION TO STERN OF THE COURAGEOUS. LEFT—INSTALLING SPECIALLY DESIGNED STERN FRAME CASTING. RIGHT—CHANGING FORM OF STERN TO IMPROVE FLOW OF WATER

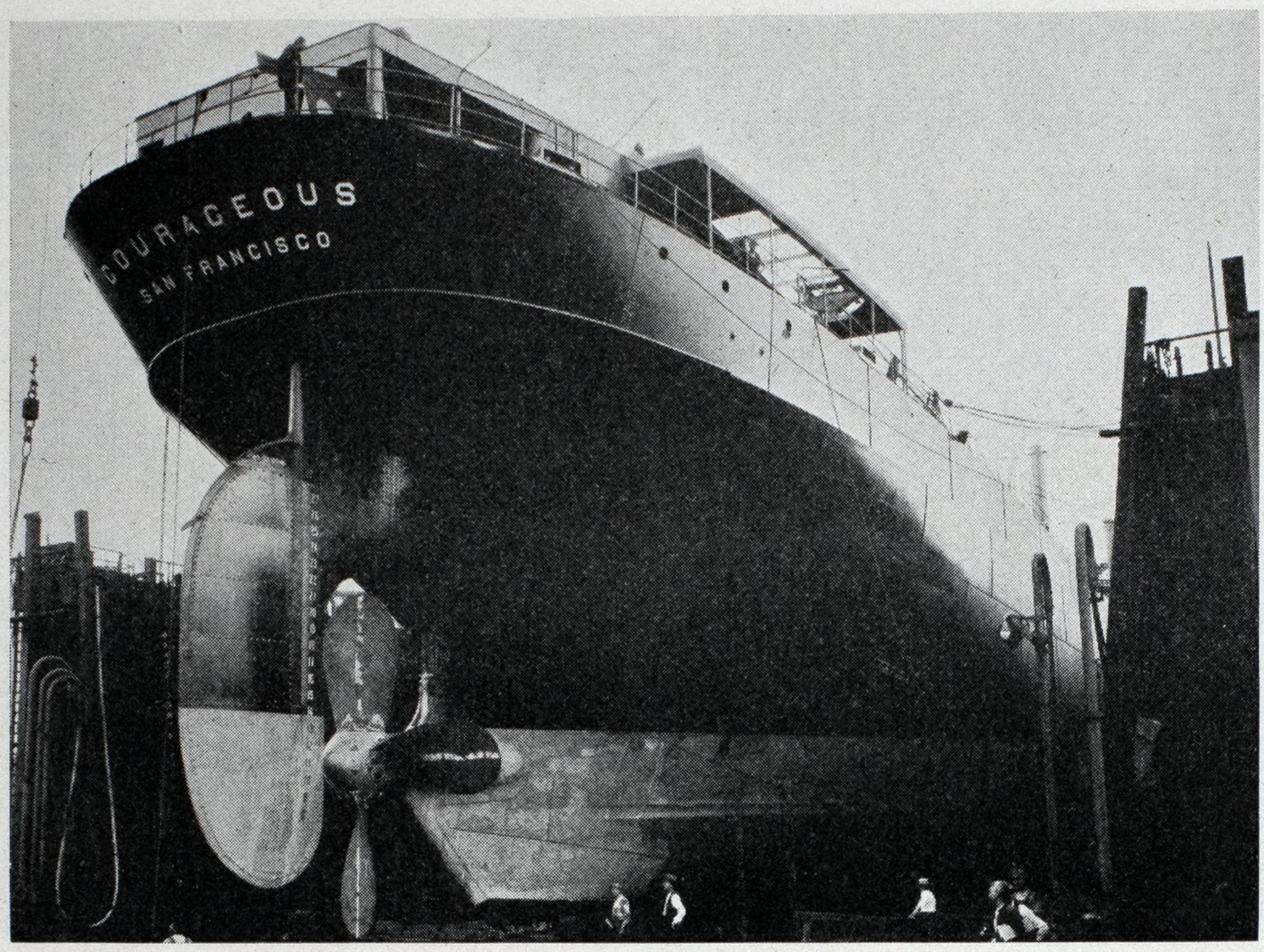
feet 6 inches and to a speed of 13 knots with diesel electric drive. A complete story of her conversion would include an account of a long series of tests and experiments, including extensive work with models at the Experimental Model basin at the navy yard, Washington, D. C. With this work a new and distinctive approach to the problem of increased speed has been made under the direction of Rear Admiral D. W. Taylor, retired, as consultant, and Gibbs Bros. Inc., New York, who acted as designing engineers for the conversion work not only of the COURAGEOUS but of two sister ships, the TRIUMPH and DEFIANCE.

Ignoring for a time the question of a power plant it was decided to try to determine the most efficient size and design of propeller for the hull. Tests of the model of the COURAGEOUS in the basin at Washington indicated that the hull itself was poorly adapted to an increase in speed. The bow was too blunt. Propeller experiments indicated that a larger diameter propeller would be advisable and with this change, a modification of the lines of the bow and stern. The ordinary procedure in equipping a hull with new propulsion machinery is to select a plant of the required rating and then to design the propeller to suit the power and revolutions per minute of the new unit. The conversion of the COURAGEOUS proceeded in the opposite direction. First the bow was redesigned and lengthened to reduce resistance. Then the size and speed of propeller were determined for greatest efficiency, and finally a power plant was designed to absorb the torque of the propeller at this speed. The designers determined upon a 21-foot 9-inch propeller at a speed of 60 revolutions a minute. To drive this propeller a heavy mill type double armature motor was selected, and to furnish energy for the electric motor it was decided to use four direct connected diesel driven generator units of about 1200 horsepower each under normal conditions.

The change in the bow was made by cutting off a section 22 feet long, rebuilding this into a 33-foot section and then reattaching the new section where the old had been cut off. The effect of the change is clearly evident in the comparative profiles. The new bow is finer and the lines are more graceful. In order to provide for the increased size of propeller it was also necessary to modify the construction of the vessel's stern. The propeller and line shafting were raised and extended and the position of the propeller was moved astern about four feet. This of course meant changing the location of the rudder and, taking advantage of this necessity, the entire stern was rebuilt to give better lines and better operation of the rudder. The improved profile of the stern is clearly shown in the accompanying illustration. The new rudder is of the balanced type without lower support which thus gives far better flow of water to the propeller and a less



McINTOSH & SEYMOUR DIESEL ENGINES FOR M. S. COURAGEOUS SHIPPED ASSEMBLED TO SIDE OF SHIP AND SO PLACED IN POSITION BY DOCK CRANE



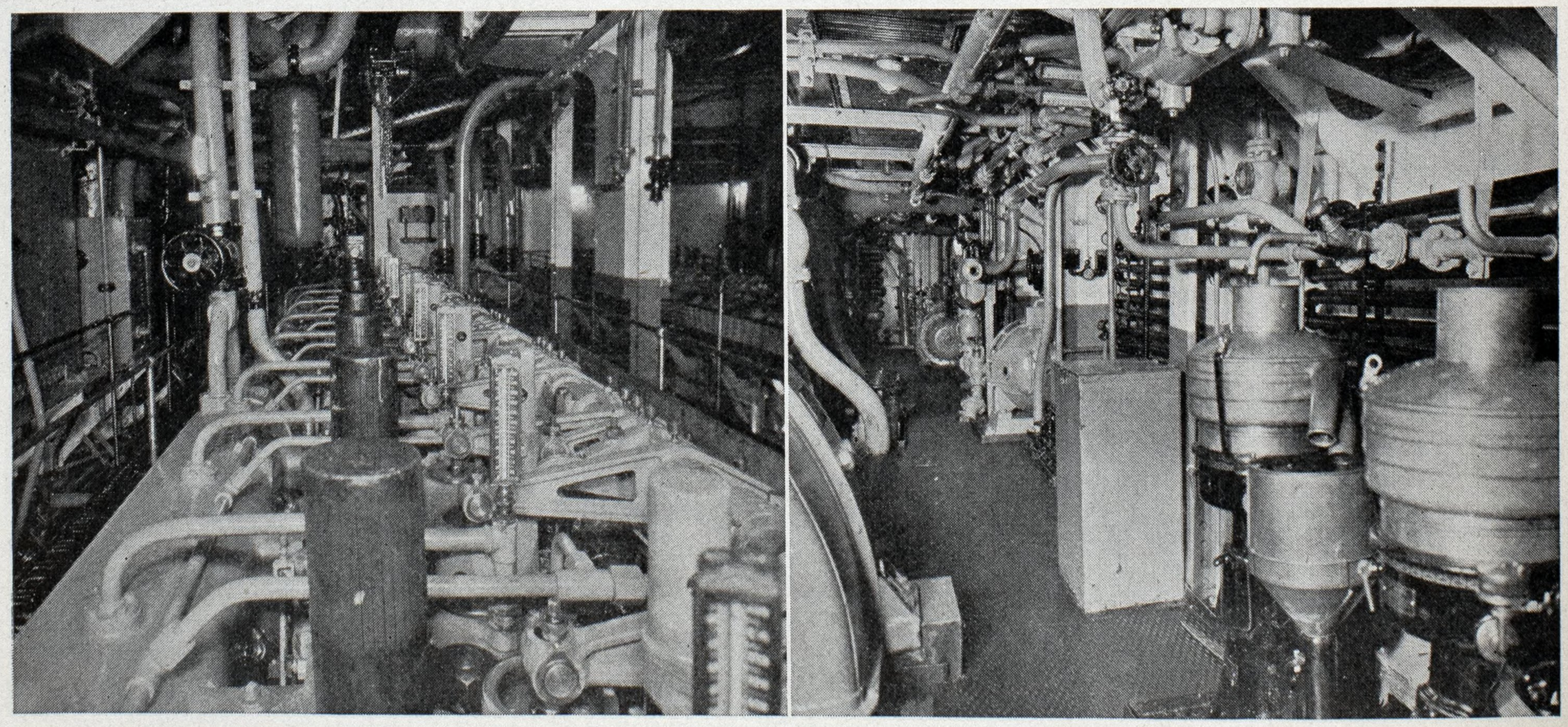
RUDDER WITHOUT LOWER SUPPORT—HUGE DIAMETER SLOW REVOLVING PROPELLER —ENTIRE STERN REMODELED TO GIVE EASY FLOW TO PROPELLER—IN DRYDOCK JULY 20, 1928 AT KEARNY, N. J.

obstructed path to the propeller stream.

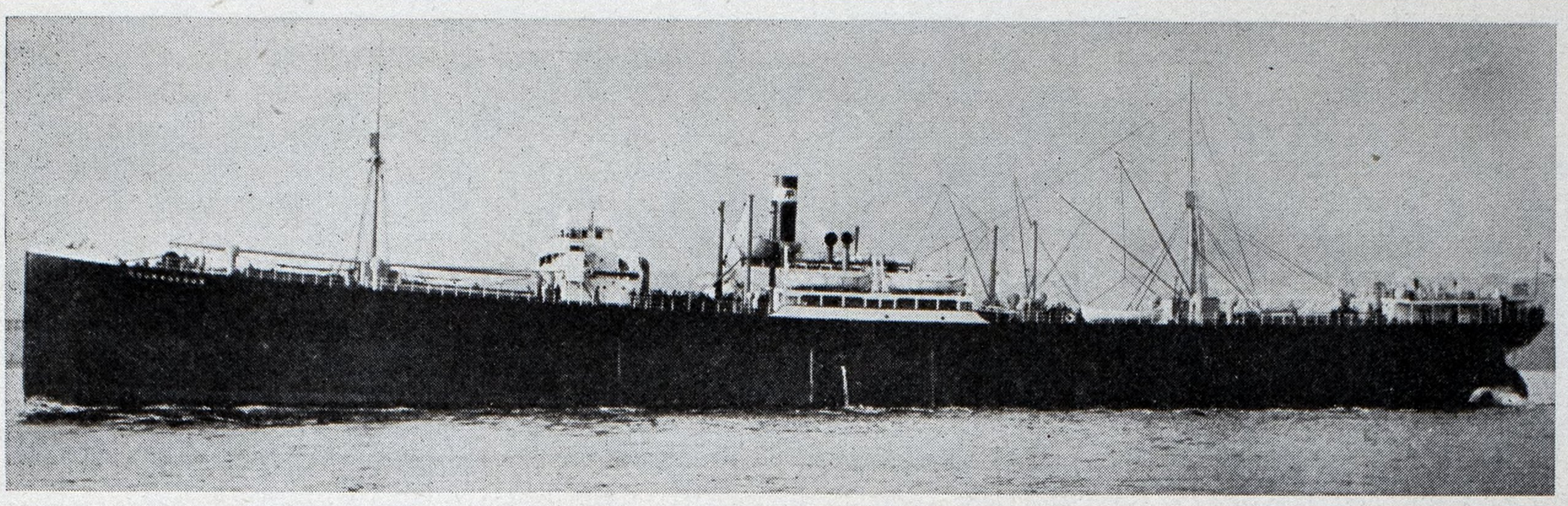
Considering that the old hull had to be altered to the extent of rebuilding both the bow and the stern, a question has arisen as to whether the conversion job was justified from an economic point of view. An entirely new ship embodying all the features of the present COURAGEOUS could have been built at a cost within a few hundred thousand dollars of the cost of conversion. However, the old COURAGEOUS, although obsolete as a freighter, was nevertheless structurally sound and well built. Aside from the economics of the conversion there is the practical consideration that the shipping board has authority to rebuild but no authority to build new ships. Thus by means of the conversion a new serviceable ship has been placed on the high seas, whereas without the conversion a useless hull would have remained to eventually reach the scrap heap.

The general scheme of the power plant of the COURAGEOUS, namely, the use of four relatively small diesel driven generators to furnish energy for the direct connected electric motor driving a single propeller has been the subject of much criticism from marine engineers. This criticism is based chiefly on the high electric losses due to the use of small units. The designers claim that these losses are more than offset by the increased efficiency secured from the large propeller traveling at slow speed. In addition to this, there is the advantage of great flexibility. The designers point out that any three of the diesel generator sets are able to carry the load and keep the vessel's speed at normal. This means that repairs can be made on any one set without interfering with the progress of the ship. Where a single large diesel engine is used, it is necessary to halt the progress of the ship while repairs are made. Another feature of the small unit is greater ease in starting and consequently smaller starting tank capacity, smaller compressor capacity, and a reduction in the number and size of auxiliary units. Each of the four main diesel units on the COURAGEOUS has its own air compressor and any two units when operating will furnish enough air for starting a third.

The procedure in starting up the machinery when the vessel is cold is to first operate a small 4-cylinder Fairbanks-Morse diesel engine direct connected to a 32-kilowatt generator which ordinarily is used for light and small electrical apparatus when the vessel is in port. The electrical current so generated is used in operating a motor driven auxiliary compressor, which in turn builds up pressure in the starting tank. This tank is merely large enough for safe operation in starting one of the four diesel units. It is less than one-fourth of the size of a tank which would be required



ENGINE ROOM OF DIESEL ELECTRIC FREIGHTER COURAGEOUS. LEFT—TOP OF ONE OF THE FOUR 1200 B.H.P. McINTOSH & SEYMOUR MAIN DIESEL GENERATING ENGINES. RIGHT—LOWER ENGINE ROOM AUXILIARIES—DELAVAL OIL PURIFIERS



Diesel Electric Freighter Courageous on Her Trial Trip out of the Yard of the Federal Shipbuilding Co.

were the vessel driven by one large diesel engine.

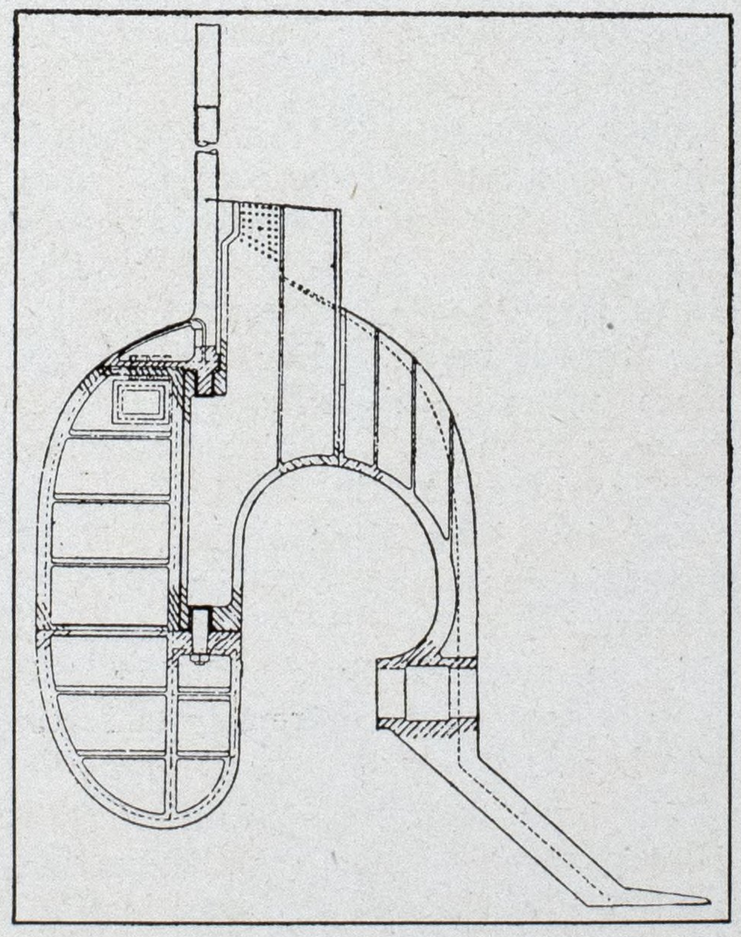
The use of electric drive for a large freighter is somewhat of an innovation in marine design. Last month the S. S. VIRGINIA started on her maiden trip. She is an electric driven ship where the generators are driven by steam turbines instead of diesel engines, as on the COURAGEOUS. Also she has two propellers, each driven by a direct connected motor. A detailed description of the VIRGINIA appears elsewhere in this issue. The General Electric Co., Schenectady, N. Y., which designed her electrical equipment, also designed the electrical features of the COURAGEOUS.

The motor of the COURAGEOUS has a double armature, so that it may be driven efficiently at three-quarters speed by cutting out one of the windings. Any one or more of the diesel generator units will serve to propel the boat. The simplicity of reversing the direction of an electrically driven ship such as the COURAGEOUS is spectacular. It is done by merely throwing a switch. One of the unique features about the electrical installation is its totally enclosed ventilating system. All of the motors, generators and exciters are connected by ventilating pipes to a central blower room which serves the double purpose of keeping the engine room cool and keeping the vapor, oil and dirt away from the electrical windings.

The four main engines in the COURAGEOUS are McIntosh & Seymour diesels of the four-cycle, trunk piston, air injection type, each having eight cylinders with 20-inch bore and 24-inch stroke. They are designed to operate at a normal piston speed of 1000 feet per minute. At this speed the normal rating is 1200 brake horsepower for each engine and at the piston speed mentioned this rating is conservative. The normal output of the electric motor on the propeller shaft is 4000 shaft horsepower, but it is capable of delivering 4500 shaft horsepower. But even at this load there is sufficient reserve power in the engines. If one engine should be shut down for any reason, the other three will be able to deliver 4000 brake horsepower to the generators for a considerable period of time.

Four Diesel Generating Sets

All of the four engines are alike, except that they are built in pairs; two right-hand and two left-hand. One pair of engines is installed on each side of the engine room, so that the two operating sides come together. In this way there are two operating alleys with the exhaust sides of the two inboard engines together, which makes a convenient arrangement for operation and control.



STERN FRAME CASTING AND BALANCED RUDDER OF COURAGEOUS—LESSENS OBSTRUCTION OF FLOW TO AND FROM PROPELLER

The overall length of the engines including the flywheel is 31 feet 8 inches and the height from the operating grating to the top of the fuel valve is 11 feet 7 inches. Each engine including flywheel, generator shaft and outboard bearing, weighs 144 pounds per horsepower at normal load.

There are in the COURAGEOUS, connected to each one of the diesel engines just described, four General Electric generators of 800 kilowatts capacity each and with exciters of 100 kilowatts each. The main propulsion motor directly connected to the single propeller is also of General Electric make and has a capacity of 4500 horsepower, maximum. At 60 revolutions per minute it will develop 4000 brake horsepower.

Ventilation of the electrical equipment as outlined above is extremely important and is supplied by two Sturtevant ventilating fans of 35,000 cubic feet a minute capacity. Silencers for the main engine, four in number, were supplied by the Maxim Silencer Co. They are 30 inches by 90 inches. Four engine circulating pumps of 400 gallons per minute capacity each and one bilge and ballast pump of 300 gallons a minute capacity were supplied by the Worthington Pump & Machinery Corp.

Included in the pilot house equipment of the COURAGEOUS are four main engine tachometers made by the American Schaeffer & Budenberg Co. A complete outfit of Sperry navigational instruments has been installed, including a master gyro compass and two steering and bearing repeater compasses; gyro pilot or automatic steerer; and a helm and angle indicator. There is a submarine signal system supplied by the Submarine Signal Corp. The whistle is electrically controlled. The searchlight has been

supplied by the General Electric Co. and there is a Kelvin sounding machine.

The arrangement of motors and diesel driven generators shows careful planning to give maximum operating efficiency. Because of the fact that the motors and generators are connected only by electric cables, the diesel generator units may be placed in the most convenient location. This adds greatly to the roomy appearance of the engine room. The propelling machinery of the COURAGEOUS now occupies part of the space formerly covered by the old machinery. The auxiliary machinery is practically all motor driven. There is one auxiliary diesel generator unit and a steam driven boiler feed pump.

The winch equipment follows the general scheme adopted by the shipping board on its other dieselized vessels. The COURAGEOUS has 12 electric winches each driven by a 25-horse-power motor. These winches were furnished by the Hyde Windlass Co., Bath, Me.

The conversion of the COURAGEOUS to a modern type of freighter was carried on in the yard of the Federal Shipbuilding and Drydock Co., Kearny, N. J. Contract for the work was signed Oct. 22, 1927, and the vessel was turned over to the Roosevelt Steamship Co. after completing official sea trials on Dec. 1, 1928. The two sister ships, the DEFIANCE and TRIUMPH, are now being converted to diesel electric drive at the Norfolk and Boston navy yards, respectively, and the time required for their conversion will be considerably in excess of the record made with the COURAGEOUS. In modernizing these freighters the designers and builder, as well as the shipping board, have had in mind the new type of vessels now being built in England, Germany and Sweden for the Far Eastern trade. These new European vessels are expected to develop from 14 to 15 knots speed and will have about the same cargo space as that provided in the COURAGEOUS.

Because the COURAGEOUS is intended for the Far Eastern trade, provision has been made for keeping the officers' and crews' quarters cool and comfortable. These quarters now compare favorably with many of the most modern vessels. Hot and cold fresh water is furnished to all of the rooms. The cruising radius of the modernized ship is about 15,000 miles, which under normal conditions is expected to make possible a run of seven weeks without refueling. The galley has been rearranged according to standard specifications of the shipping board and now includes electrical apparatus and an oil fired range. The master of the COURAGEOUS is Capt. P. P. Taylor, who was formerly captain of the TAMPA.

Coast Guard Cutter Rescues Newport

BY S. D. HENDERSON

A FEW weeks ago the new coast guard cutter CHELAN with full complement of officers and crew and several guests left the Boston navy yard on her maiden trip, a so-called ten day "shake down" cruise. A speed of ten knots was maintained and various light ships were picked up as we made our way down the coast. Three days after our departure, storm warnings were received and we barely had time to make Delaware breakwater to escape an 84 mile an hour gale. Continuing on our trip the following day, we passed Cape Hatteras and finally headed toward Bermuda. Seas were heavy but the new cutter proved herself a good sea boat.

Cutter Arrives at Burmuda

Arriving at Bermuda after eight days out, we moored to a buoy in the picturesque harbor of Hamilton and all hands went ashore for the evening. One has no fear of being run down by a "hit and run" driver in Bermuda as no motor vehicles are allowed on the island, bicycles and horses being used for transportation. Sight seeing from a buggy is excellent as one cannot miss a thing. Everyone enjoyed the evening ashore and on returning to the ship we learned that an S O S had been received and we were to go to the assistance of the training ship NEWPORT which was disabled near the Azores.

An extra supply of water and provisions was taken aboard the following day and soon we were driving full speed ahead for the NEWPORT, one thousand miles away. We steamed forced draft for three days and nights until right after the noonday meal of the fourth day, when the NEWPORT with sails set loomed on the horizon. Provisions were transferred, a 12-inch hawser sent aboard, and shortly we had the training ship in tow and were headed for New York about 2000 miles away.

With calm seas a towing speed of nine knots was logged for the first two days, but then the weather grew bad and speed was reduced to four knots to keep the NEWPORT from being towed under. For eight days more we plowed along with speed ranging from four to nine knots and finally brought the training ship safely into New York harbor. Much credit is due Captain Dempwolf and his crew for their excellent seamanship in successfully completing this long tow under extremely adverse weather conditions.

The New York State Nautical Ship NEWPORT is a 1050-ton barkentine, equipped with an auxiliary engine. She was on her yearly cruise with about 120 students and crew, when about 500 miles off the Azores she lost her propeller. Absolutely becalmed, the NEWPORT in spite of having all sails set, had logged only a few miles in two weeks. Provisions had run low and the arrival of the CHELAN was most welcome.

The machinery of the CHELAN received a severe test during this unusual maiden trip and its excellent performance throughout the entire voyage paid high tribute to its design and manufacture.

Turbine Electric Drive Fitted

The CHELAN is the first of five cruiser-type cutters built by the Fore River plant of the Bethlehem Shipbuilding Corp. for the United States coast guard service. She, and her sister ships, PONTCHARTRAIN, TAHOE, CHAMPLAIN and MENDOTA, are 250 feet long, with a 42-foot beam and displace 2100 tons. These vessels are all equipped with turbine electric drive manufactured by the Westinghouse Electric & Mfg. Co.

The author, S. D. Henderson, is an engineer with the Boston service department of the Westinghouse Electric & Mfg. Co.

U. S. Lines Show Profit

The United States Lines showed a profit of $193,882 during the month of October and thereby increased the total earnings of the shipping board's transatlantic passenger service to $1,248,331 for the fiscal year 1928. It is estimated by officials of the board that this year's profit will wipe out the loss recorded for the last fiscal year.



Cadillac—Detroit and Windsor Ferry

Spacious Automobile Deck of the Automobile and Passenger Ferry Cadillac in Service between Detroit and Windsor, Ont.

TRAFFIC across the Detroit river between the great city of Detroit and the growing city of Windsor in Ontario, one of Canada's richest and most populous provinces, is growing at an amazing rate. In summer particularly there is a heavy traffic in ferrying automobiles for thousands of tourists and others visiting back and forth between the two countries. For this purpose both Detroit and Windsor serve as excellent ports of entry and departure.

It was to take care of this increased business that the Detroit and Windsor Ferry Co. ordered a new passenger and automobile ferry, to be named CADILLAC, from the Great Lakes Engineering Works, River Rouge, Mich. The contract was signed Nov. 5, 1927. The keel was laid Dec. 29, 1927; and the CADILLAC was launched March 10, 1928. The Detroit and Windsor Ferry Co. used one of its other steamers to take employes of the company to the shipyard for the launching. The new steamer was christened with a bottle of spring water from a spring at the company's park, Bob-Lo island. Mrs. William Green, daughter of Capt. Fred J. Simpson, vice president and general manager of the Detroit and Windsor Ferry Co. acted as sponsor.

The CADILLAC was delivered to the owner April 19, 1928, and immediately entered service with the other steamers of the company, the LA SALLE, BRITANNIA and PLEASURE, inaugurating a six minute service for automobiles and passengers between Detroit and Windsor, Ont. Adding the CADILLAC makes this a quick convenient, comfortable and pleasant means of transportation across the Detroit river.

Accompanying illustrations show the general features of the new ferry. She is designed for the rapid handling of automobiles and passengers and is practically a duplicate of the steamer, LA SALLE, which came out in 1922. Both the CADILLAC and the LA SALLE were designed by one of the country's oldest and most noted naval architects, Frank E. Kirby. The main deck is of steel and is unobstructed to facilitate the movement of automobiles. All of the passenger decks are floored with United States rubber tile. There is an observation room forward on the promenade deck which is used as a smoking room for men.



Automobile and Passenger Ferry Cadillac Bound for Windsor, Ont.—Detroit Skyline in Background

There is ample capacity for 70 automobiles and 2500 passengers.

In engineering features the CADILLAC is entirely orthodox. For propulsion steam is furnished by two coal burning scotch boilers to a 3-cylinder vertical compound engine driving a single propeller. The speed of the vessel is 15 miles per hour. General dimensions are: Length overall, 170 feet 6 inches; length on waterline, 155 feet 8 inches; beam of hull, 56 feet; beam overall, 68 feet 1 inch; depth molded, 17 feet 11 inches; draft, 13 feet 3 inches; displacement, 1380 tons, gross registered tonnage, 636; net registered tonnage, 404. The hull is divided into five watertight compartments.

The main engine, of vertical compound type with three cylinders, was built by the Great Lakes Engineering Works. The cylinders are 22 x 32 x 32 inches in diameter and the stroke is 36 inches. The two boilers, of scotch type, were built by the Toledo Shipbuilding Co. Inc. Each boiler is 14 feet in diameter and 10 feet 6 inches long and the working steam pressure is 185 pounds per square inch. Cold forced draft is used. The main engine develops 1300 horsepower normally and 1800 horsepower, maximum. A solid four bladed propeller is used and it is 11 feet in diameter and 13 feet in pitch. It was cast and machined by the Great Lakes Engineering Works.

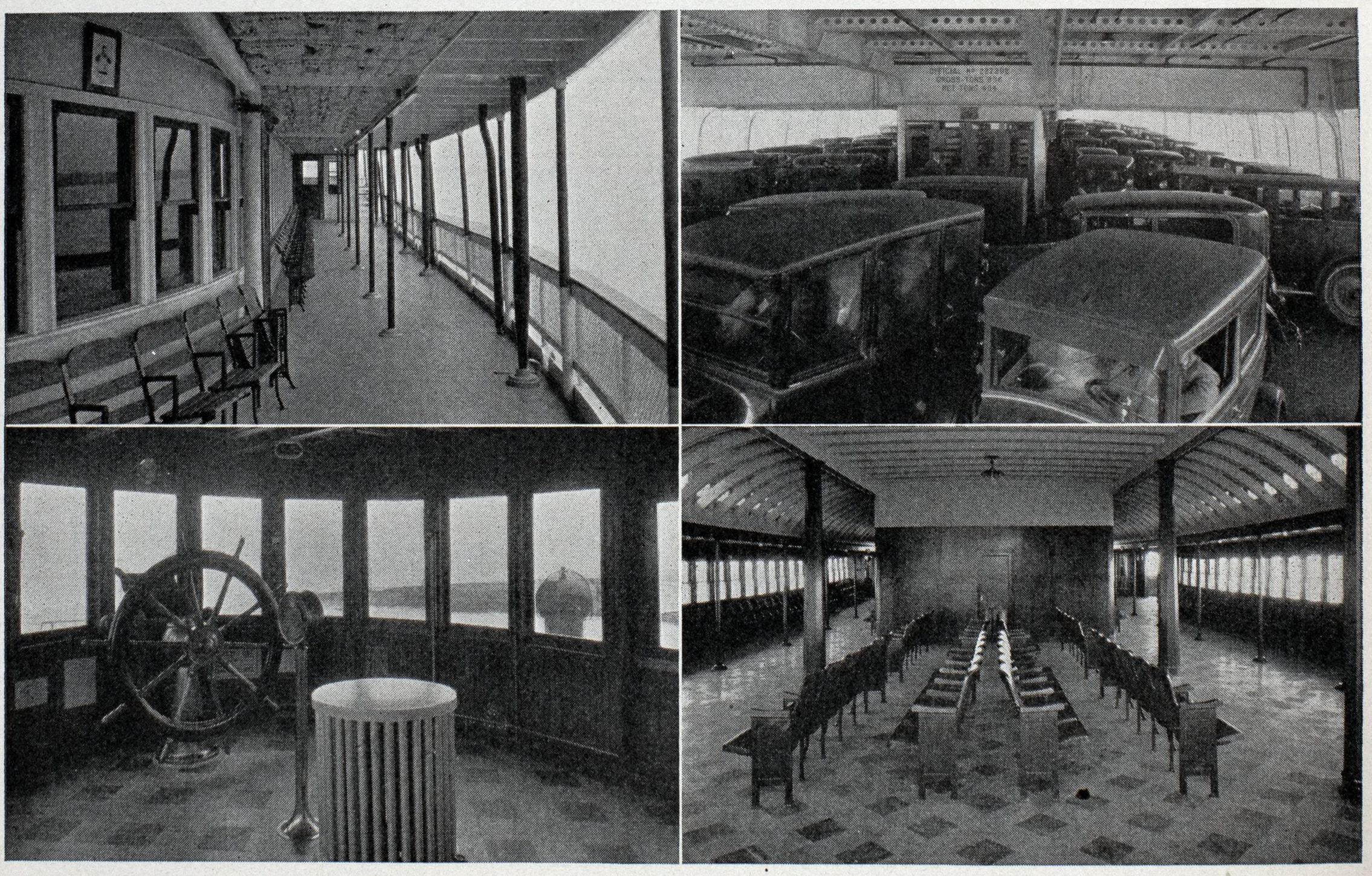
The vessel throughout is fully equipped with modern type steam driven auxiliaries. Various pumps were supplied by Worthington Pump & Machinery Corp. The windlass and the steering engine, the latter of the type which is directly connected to quadrant, were both supplied by the Hyde Windlass Co. Freight gangplanks are lowered and raised by two Dake winches made by the Dake Engine Co., Grand Haven, Mich. There are also two Jacques hand winches for the passenger gangplanks and four Jacques hand winches for the life boat davits. Two 15-kilowatt Engberg reciprocating steam engine driven generators have been installed for lighting and other electrical requirements. There is also an auxiliary 5-kilowatt Westinghouse turbine driven generating set. Valves of various kinds in the engine room and elsewhere have been supplied by three manufacturers, there being valves of Leslie, Powell and Crane Co. make on board this vessel. There is a Worthington jet condenser and a Reilly feed water heater. The searchlight is of the Sperry type.

Building of the ferry, CADILLAC, is an excellent illustration of that demand for vessels of various classes for our own domestic purposes as population and wealth increases and traffic grows. The business maintained by this company is profitable and is constantly expanding. It may be that another year will make it necessary to still further increase the fleet.

Captain Rockwell Dies

Captain Eli B. Rockwell, the oldest steamboat captain in the world in active service, died at St. Albans, Vt., Dec. 3. Born at North Hero, Vt., in 1830, Capt. Rockwell served as mate, pilot and master on 13 different vessels, all of which plyed Lake Champlain. At the age of 15, the captain shipped as cabin boy on the schooner CYNTHIA, which was commanded by an older brother. At the age of 18, he succeeded his brother in command and remained master of the vessel for two years. Two years later he entered the employ of the Champlain Transportation Co. in whose service he remained until his death.

In 1868, the captain saved the lives of 125 passengers on the ADIRONDACK when fire broke out in a boiler room. Believing the stream of water insufficient, he directed a stream of live steam on the blaze and extinguished it. He was very widely known.



PASSENGER AND AUTOMOBILE FERRY CADILLAC. UPPER LEFT—PROMENADE DECK. UPPER RIGHT—CAPACITY LOAD OF AUTOMOBILES. LOWER LEFT—INTERIOR OF PILOT HOUSE. LOWER RIGHT—PASSENGER CABIN AFT

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November 1928.....	516	2,237,046	550	2,418,097
October	596	2,666,360	589	2,571,403
September	545	2,424,887	543	2,362,154
August	580	2,533,877	622	2,733,727
July	602	2,526,107	564	2,415,168
June	537	2,386,509	602	2,645,954
May	580	2,498,280	590	2,463,196
April	566	2,487,959	541	2,359,979
March	548	2,338,855	578	2,449,705
February, 1927	513	2,205,204	501	2,135,910

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	88	229,598	36	89,931
October	91	250,902	48	137,352
September	84	238,234	43	122,389
August	96	266,104	58	161,365
July	101	254,378	60	143,573
June	101	270,069	72	183,534
May	110	281,648	74	179,108
April	109	261,735	60	140,547
March	95	254,304	65	167,100
February, 1927	88	239,768	53	152,545

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	107	315,954	74	214,574
October	112	347,432	72	221,761
September	113	383,749	77	245,068
August	130	340,569	107	270,757
July	155	378,368	111	289,121
June	143	319,611	100	254,906
May	134	304,575	103	231,851
April	110	343,360	65	205,257
March	108	348,026	67	194,408
February, 1927	100	301,053	50	160,330

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	20	37,250	19	33,408
October	23	39,959	22	40,588
September	30	53,338	30	51,018
August	30	48,256	28	47,078
July	38	68,208	38	66,389
June	30	40,255	25	33,834
May	23	26,648	19	28,673
April	20	51,854	19	50,175
March	20	58,110	22	69,400
February, 1927	18	44,067	17	47,032

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	10	35,147	7	21,143
October	6	14,667	9	20,551
September	5	18,895	3	12,777
August	7	28,611	4	19,978
July	8	26,920	7	25,451
June	8	35,177	7	25,741
May	7	21,068	4	12,765
April	4	15,670	3	12,362
March	7	27,885	6	26,037
February, 1927....	3	6,656	4	17,543

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	30	115,469	53	198,195
October	42	154,623	62	224,018
September	41	150,368	57	203,758
August	35	136,504	47	172,693
July	30	111,042	46	157,354
June	23	85,328	40	144,572
May	25	96,976	44	159,070
April	37	137,821	41	152,042
March	29	111,490	49	170,655
February, 1927	23	86,160	35	120,026

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	134	412,100	134	417,523
October	133	402,263	131	406,142
September	119	374,500	128	396,749
August	133	404,303	144	440,016
July	128	378,827	121	353,758
June	127	392,580	135	412,620
May	135	413,038	151	439,278
April	140	396,942	134	394,124
March	128	391,117	137	408,927
February, 1927....	134	412,110	135	399,729

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	19	58,171	77	209,023
October	12	33,817	66	173,729
September	21	64,366	69	178,508
August	19	50,096	83	208,639
July	15	33,548	81	212,471
June	19	42,454	63	155,944
May	25	58,472	78	207,857
April	15	35,122	81	189,564
March	18	39,102	89	209,171
February, 1927	13	32,925	77	206,630

Jacksonville

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	26	64,406	27	67,621
October	23	55,147	22	53,094
September	40	89,032	42	94,981
August	37	85,186	34	83,694
July	30	81,634	31	79,222
June	26	54,449	28	57,111
May	26	58,800	28	63,779
April	26	68,581	26	61,939
March	25	65,435	28	68,630
February, 1927	31	70,881	28	58,896

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	98	81,666	101	82,863
October	120	111,450	116	106,139
September	84	60,079	86	62,698
August	91	73,771	89	69,532
July	86	65,838	88	67,720
June	98	83,417	93	78,006
May	134	117,930	129	112,303
April	101	75,140	102	76,450
March	119	96,746	112	94,408
February, 1927	121	91,928	109	88,819

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928	91	203,865	77	184,537
October	89	185,031	71	166,606
September	85	209,709	74	193,661
August	90	186,097	78	178,036
July	101	209,990	82	189,008
June	85	176,088	82	178,337
May	102	227,194	90	209,449
April	114	217,803	105	203,515
March	107	242,444	97	246,634
February, 1927	94	271,569	83	226,210

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	68	285,564	75	306,605
October	62	245,420	60	243,778
September	57	229,718	66	254,503
August	55	220,858	53	228,378
July	64	261,850	58	228,946
June	44	180,482	44	185,765
May	53	206,254	61	239,241
April	56	226,257	54	210,908
March	46	191,601	46	196,371
February, 1927.....	54	210,176	53	207,173

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	252	690,157	263	716,105
October	259	682,184	329	627,989
September	228	617,636	248	661,643
August	264	667,055	265	690,341
July	260	659,457	245	615,234
June	253	615,672	263	640,136
May	263	671,333	261	647,504
April	254	656,537	265	666,345
March	265	669,301	282	720,407
February, 1927	238	627,445	236	616,772

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net. tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	22	56,983	22	50,043
October	24	59,136	26	61,673
September	21	60,956	22	54,537
August	24	62,574	26	63,874
July	26	59,204	27	61,976
June	17	37,881	20	41,123
May	29	71,467	32	78,731
April	26	60,165	21	52,590
March	29	79,789	27	67,472
February, 1927	26	74,244	27	73,168

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1928	41	110,825	135	420,534
September	26	69,433	98	313,816
August	31	91,959	78	261,804
July	41	91,686	68	196,424
June	20	52,884	64	210,110
May	35	96,852	44	126,027
April	32	85,685	43	132,534
March	35	75,924	47	121,106
February	27	63,696	52	147,378
January, 1927	32	83,419	52	150,260

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	188	504,630	189	482,133
August	164	539,454	160	514,978
July	153	547,612	131	485,817
June	152	434,811	114	428,885
May	236	545,132	150	478,553
April	183	519,918	184	498,424
March	182	522,110	222	483,105
February	164	466,319	172	439,193
January	167	477,974	165	437,080
December	195	561,525	158	517,376

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928....	157	504,269	157	589,810
October	165	620,117	155	596,750
September	180	623,999	175	579,262
August	185	674,832	164	643,965
July	147	662,437	122	454,802
June	149	567,839	141	539,600
May	174	869,626	175	625,910
April	157	580,506	150	565,111
March	179	629,773	162	648,057
February, 1927....	158	501,080	165	640,220

Port Arthur

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1928	24	78,538	33	109,230
June	25	80,481	25	79,758
May	27	92,323	28	90,108
April	24	73,693	26	88,253
March	46	127,039	47	131,741
February	47	144,273	44	144,508
January	20	69,947	20	72,185
December	23	67,105	21	68,602
November	21	64,277	25	80,084
October	18	50,632	25	82,177
September, 1927 ..	16	51,492	29	83,728

Note: The figures given in this table are for direct entrances and clearances. Additional vessels in foreign trade enter and clear from and to other American ports after original entry and before final departure. At the port of Philadelphia, for instance, additional vessels in the foreign trade in this category were 57 of 194,853 net tons entered and 57 of 178,348 net tons cleared for the month of November.

Free Libraries on Merchant Ships Give Real Service to Seamen

By A. H. Jansson

WE ARE living in an age of progress. The world is teeming with ideas to make ships more efficient mechanically. Improvements in machinery are sought to cut down the cost of operation. The burden of manual labor on board ship is being constantly lightened. In the United States particularly, the slogan in shipping is—give real men good wages and reduce the overall cost of operation by the application of power and the use of more efficient machinery. More and more the welfare of the seaman is the first consideration of the successful modern shipowner and operator. The reason for this is not primarily the exceptional humanity of the American operator but rather his understanding that well fed, well housed, well paid and contented men will do much more and much better work and that thus in the long run his operating costs for the results obtained will be correspondingly less.

Going to sea is an ancient occupation in the history of the world and is the last one affected by modern progress. How foolish the idea would have seemed only twenty-five years ago to have seriously proposed that ships should carry libraries so that the men of the crew might have good books to read in their leisure time while at sea and in port! But times are changing and progress, even afloat, though it is slow, is sure and steady. In two previous issues of MARINE REVIEW, one nearly five years ago, we have taken particular pains to bring out the excellent work being done for the men of the American merchant marine by the American Merchant Marine Library association of which Mrs. Henry Howard, is president. In the intervening years, this work of furnishing free libraries has continued with ever increasing effectiveness as an influence for good.

Origin of Ships' Libraries

The work had its inception in 1918 when Mrs. Howard, as chief of the social service bureau of the recruiting service of the United States shipping board, enlisted the help of the American Library association in providing books to the East Boston Training station. This was the beginning.

A year after the end of the war in order to continue this work the American Library association appointed Mrs. Henry Howard as its representative with the request that she organize a non-sectarian organization to continue and extend the wartime service. And so the American Merchant Marine Library association came into being. Due to the fine organizing ability of its leader, her tireless work, unchangeable enthusiasm and stick-to-it-iveness, the American Merchant Marine Library association is now a large and flourishing organization which has the active support of practically all American steamship owners. The office of the association is at 67 Wall Street New York city.

Backed by Steamship Owners

Only a short time ago a luncheon was given to the American Merchant Marine Library association by Frank C. Munson, president of the Munson Steamship lines. James A. Farrell, president of the United States Steel Corp., by inheritance a real shipping man, as his father, so the story goes was lost at sea as captain of an American ship, was a guest at this luncheon, and one of the speakers. Among other things, he said that the influence of the ships' libraries supplied by the association tended to develop a better class of seamen. He also remarked that the seamen prefer educational books to fiction. Others attending the luncheon who spoke were Capt. John F. Milliken, secretary of the Neptune association and Bert L. Todd, secretary of the Ocean association of marine engineers. Both of them praised the work of the association.

The annual report for the year 1927, which has recently been issued, shows that 1776 ships receive free libraries and that libraries also go to 225 lifesaving stations and 60 lighthouses. The total number of libraries lent to ships and stations was 5535, and in this way 258,448 books were placed in circulation. The increase in books in circulation over 1926 was 4793. Three hundred and ninety-six of the 1776 ships receiving libraries are vessels of the Great Lakes. The others sail from Atlantic, Gulf and Pacific ports to all known parts of the world.

The American Merchant Marine Library association is often spoken of as the public library of the high seas because it does for men at sea, sailing on American flag vessels, or on watch in many a lighthouse, lightship or isolated lifesaving station, what the public libraries do for the rest of us on shore. It is a great co-operative effort in which the chief executives of the nation are interested as well as many hundreds of private citizens representating practically every state and every walk of life. It is a great help to the men in their technical study. Sailors, firemen, oilers and licensed officers and engineers may pursue studies which will fit them for promotion to more responsible duties.

Support of the American Merchant Marine Library association depends upon voluntary contributions from those who are interested in this work. The men on board ship directly benefiting from the circulation of these books may become annual members by contributing one dollar. Nearly 3500 men who go to sea are now members, To obtain books many drives have been held in practically all of the ports of the country including the Great Lakes and the Ohio and Mississippi rivers. Many thousands of books have been obtained in this manner.

Handbook for Shore Leave

Recently the board of commissioners of the Port of New Orleans assigned to the American Merchant Marine Library asociation without charge, a room in its old Poydras street tool house for the purpose of storing and assembling books for the use of merchant seamen. The new quarters will greatly reduce the time and labor required in placing libraries on board vessels. The general manager in this connection said, "the work done by this association and particularly by the local chapter of which Mrs. Ernest Lee Jahncke is chairman, has been of great service and is a valuable adjunct to the facilities furnished by the port."

In addition to her labor in connection with the library work, Mrs. Henry Howard has been responsible for the preparation of a *Seaman's*

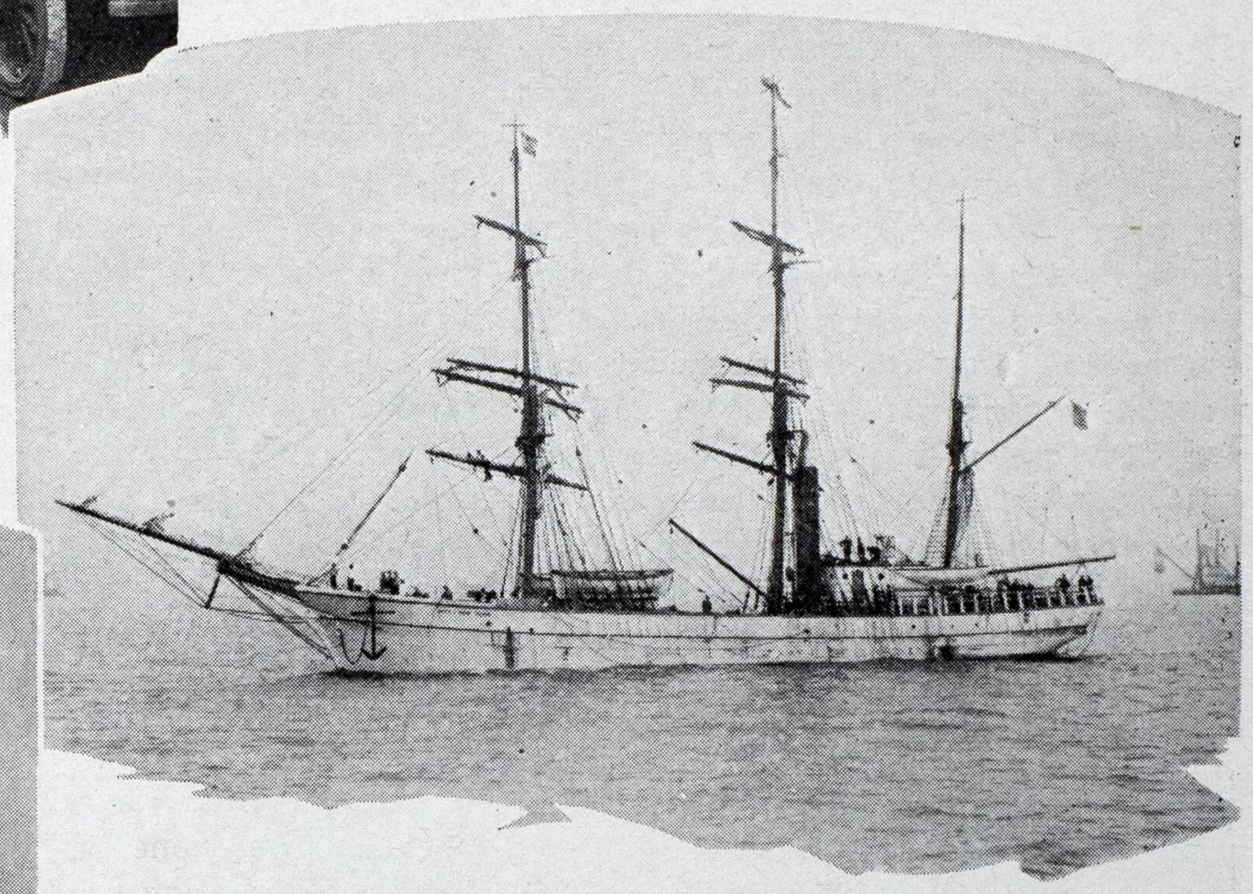
BELOW—Collecting books for seamen; carried out by Junior League girls in Boston under the direction of the American Merchant Marine Library association. In many of the largest port cities, including New York, similar drives were made. Thousands of books were collected, all intended for distribution to merchant ships.



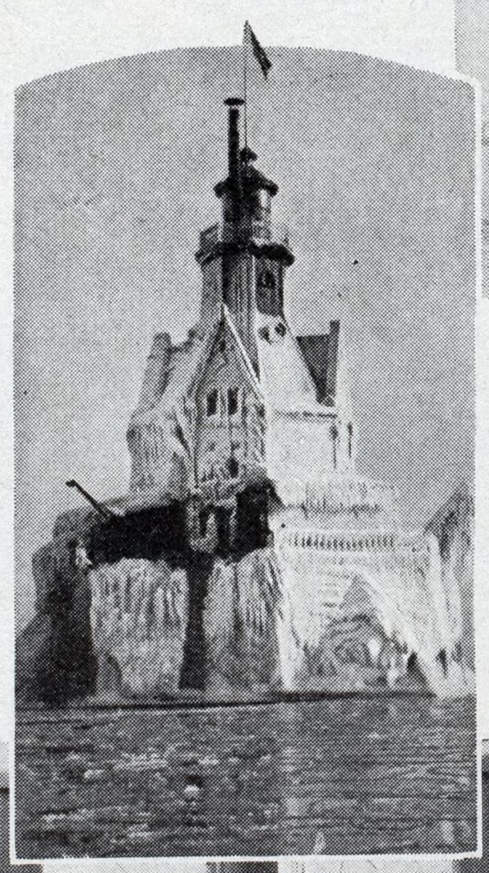


ABOVE—During the long days and nights in the Antarctic, books will help to relieve the monotony of Commander Byrd and his men. The American Merchant Marine Library association delivering a ship's library on board the CITY OF NEW YORK *while she was being fitted out for her voyage to the South Pole.*

AT RIGHT—A reminder of other days. The bark, CITY OF NEW YORK, *one of the ships of the Byrd South Polar expedition at anchor in New York harbor. As this is being written, she is approaching the great ice barrier. For this ship, on such a voyage, books are almost a necessity.*



AT RIGHT—Like a fairy castle. A winter scene at Racine Reef Lighthouse, Lake Michigan, Wis. Vessels on the Great Lakes are well supplied with books. Lighthouse keepers and others in isolated positions are also loaned books.



BELOW—Seamen picking out a night's reading, on board a merchant marine freighter, from the ship's library. In a measure these men on board ship now have the advantages of a public library.





ABOVE—The American freighter, EAST WIND, *in the New York to Australia run when this photograph was taken. In the tropics the men practically live on deck. While off duty books seem to be popular with this crew. Reading is a relaxation from the working routine and many of the men appreciate the chance to obtain books.*

Handbook For Shore Leave. The idea of this handbook also originated in the days during and shortly after the war in connection with the work then being done by the social service bureau of the United States shipping board recruiting service. When this bureau was closed the compiling of future editions came to a standstill. Letters were received asking for later editions of the book and steps were finally taken to compile the present 1928 edition. This was made possible because the Cleveland committee of the American Merchant Marine Library association volunteered to meet the expense. The book is of pocket size and contains dependable information on 352 ports, from Aalborg, Denmark to Yokohama. The information in this book is of special interest to merchant sailors and includes facts about hotels; seamen's homes; recreational facilities; location of American consulates; addresses for legal, medical, surgical and dental aid; shipping agencies; seamen's unions; public libraries; and also places of amusement and the most interesting sights in or near the various ports. A clear summary of the usefulness of this handbook is given by President-elect Hoover in the following words:

"By furnishing our seamen with a practical guide giving concise information about living quarters, amusements and resources available to mariners while in a strange country, much should be accomplished to counteract the temptations peculiar to seaports, raise the standard of our seamen and assist them when in distress in foreign ports."

For the good of the seaman himself and to continue to improve the standard of life afloat so that American flag ships may be recognized in all ports of the world as clean, orderly and efficiently operated, and the homes of virile, intelligent and contented men, the work of the Merchant Marine Library association should be actively supported by shipowners, officers, men, and Public.

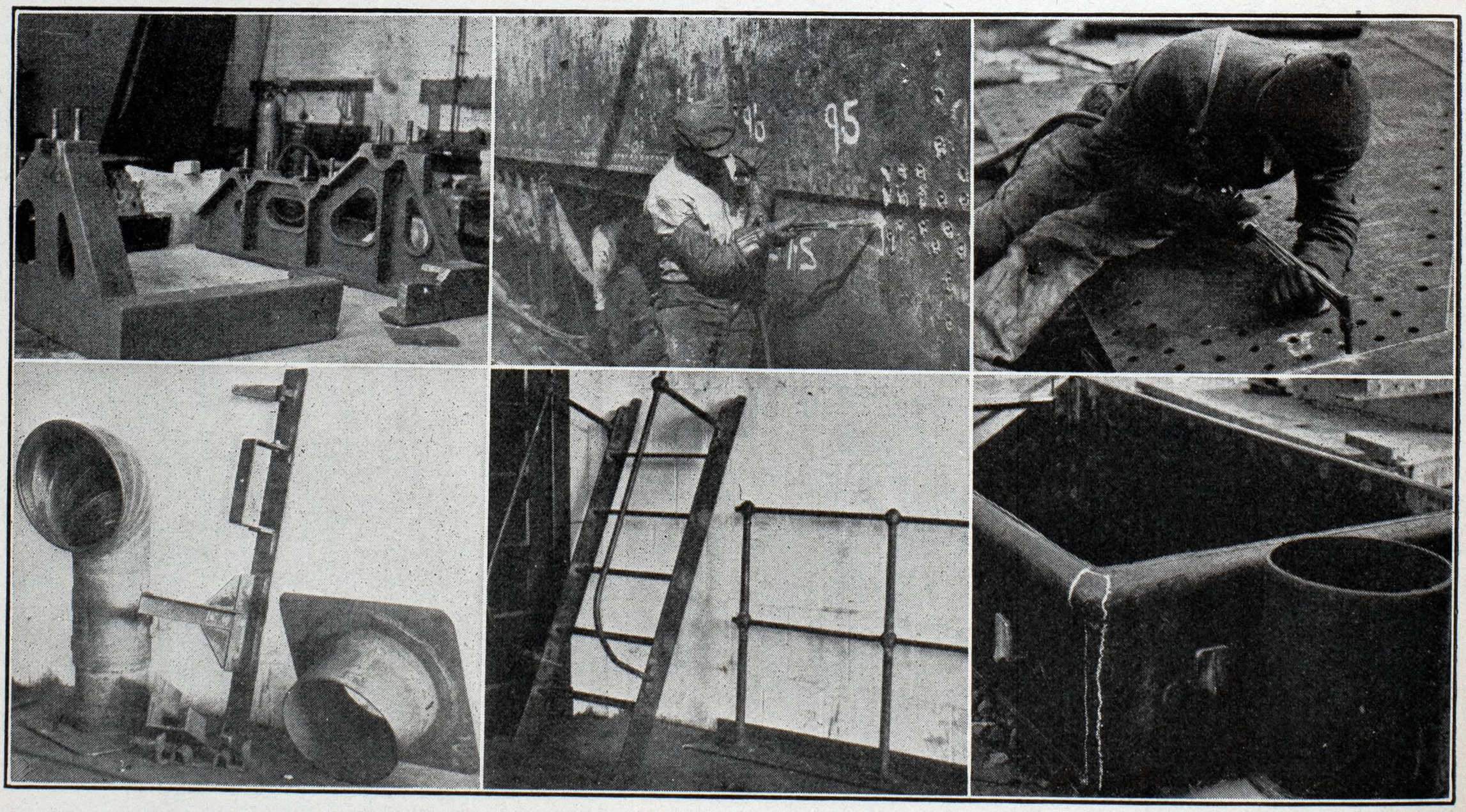
Oxy-Acetylene Repairs on Board Ship

NAVAL and shipping interests have long been cognizant of the importance of the oxy-acetylene process aboard ship. The many applications ashore and afloat during the World war brought the welding and cutting blowpipe promptly to the fore as a repair and emergency tool and today many a ship sailing the seas carries a welder and welding equipment. It is quite natural that all major repair jobs are best accomplished in drydock or shipyard but there are a great many minor and emergency repair jobs that can be handled satisfactorily afloat.

The engine room on a ship is a sea-going power plant. Weight and space must be reduced to a minimum. The maintenance of maximum ventilation and light is a real problem. These conditions suggest a reason for the importance of the oxyacetylene process in the engine room. Hatch frames, grating platforms, ladders, hand rails, ventilators, tanks and piping systems, are all visible parts fabricated and repaired by welding.

The welded joint is ideal for piping systems of any kind and is being steadily substituted in place of its less satisfactory predecessors. This type of joint is more compact, requires no flanges, lasts longer, and is usually cheaper. In addition it is absolutely leakproof. For straight lines and such pipe specials as headers, manifolds, traps, bends, crosses, tees, ells and reducers, the welded joint gives a permanent, shipshape appearance, afforded in no other way. Sand holes, cracks, splits or complete breaks in any part of a pipe line are quickly repaired by this practical means.

At sea, when a job cannot be brought to the welding shop because of its size or fixed position, oxy-acetylene welding and cutting apparatus is readily carried to the spot and the job done in place. This is



OXY-ACETYLENE CUTTING AND WELDING AS ACTUALLY USED IN SHIPWORK. UPPER LEFT—BROKEN HEAVY ENGINE BASE PREPARED FOR WELDING. UPPER CENTER—CUTTING OUT RIVETS. UPPER RIGHT—CUTTING SHIP PLATES. LOWER LEFT AND CENTER—COMMON WELDING APPLICATIONS OF SHIP PARTS. LOWER RIGHT—WELDED HATCH COAMING BOTH STRONG AND NEAT

the great advantage of the process. Deck equipment is often repaired in this manner. Recently a loading derrick on one of our largest passenger ships broke while at sea. The derrick would need to be in perfect operating condition when the vessel reached port, so a welder was assigned to the job. He first built a temporary firebrick preheating furnace around the frame, and after sufficient preheating, oxwelded the break directly in place. Such jobs, although they receive the special commendation of the officers in charge, are not less important than the routine work which has become standard with the process. Anchor winches, warping capstans, winch drums, gears, levers, and cylinders repaired on deck or below, can be made ready for service quickly.

Many parts aboard ship become worn and, in this way, lose their usefulness even though not actually broken. This is overcome by that invaluable application of the blowpipe commonly known as "building up." A great deal of work of this type is done on such auxiliary equipment in the engine room as electric motor shafts, refrigerating machinery parts, and pumps, as well as on deck machinery, mooring cleats, worn hawse pipes, gears and pinions.

The welded joint is ideal for repairing shabby, dilapidated ventilator funnels whose riveted joints are badly corroded, thereby weakening the entire structure and making it easy prey for high winds and winter storms. A great many ventilators are now welded throughout before installation on ship board and are thus literally one piece of metal, equal to any stresses or weather conditions to which they may be subjected.

Deck rail stanchions, merely riveted to the scuppers, are attacked by corrosion at the base, and although a coat of paint may cover the defect and prevent further corrosion, yet the structure may actually be weakened beyond safety. Welding around the stanchion base has been adopted as the modern means of securing the stanchion to the deck. Deck rail lengths, thrust through the stanchions, are joined with welds; also the rail ends at gate openings.

Oxyacetylene cutting also plays an important part in maintenance and repair about a ship. A typical example may be found in the insertion of hawse pipes. Holes are cut in the fore peak shell plates and the hawse pipe welded into place. Mooring eyes are built into the bulwark in the same manner. Compartment doors in bulkheads and any number of jobs in accommodation quarters are also welded.

Diesel Engine is Tested

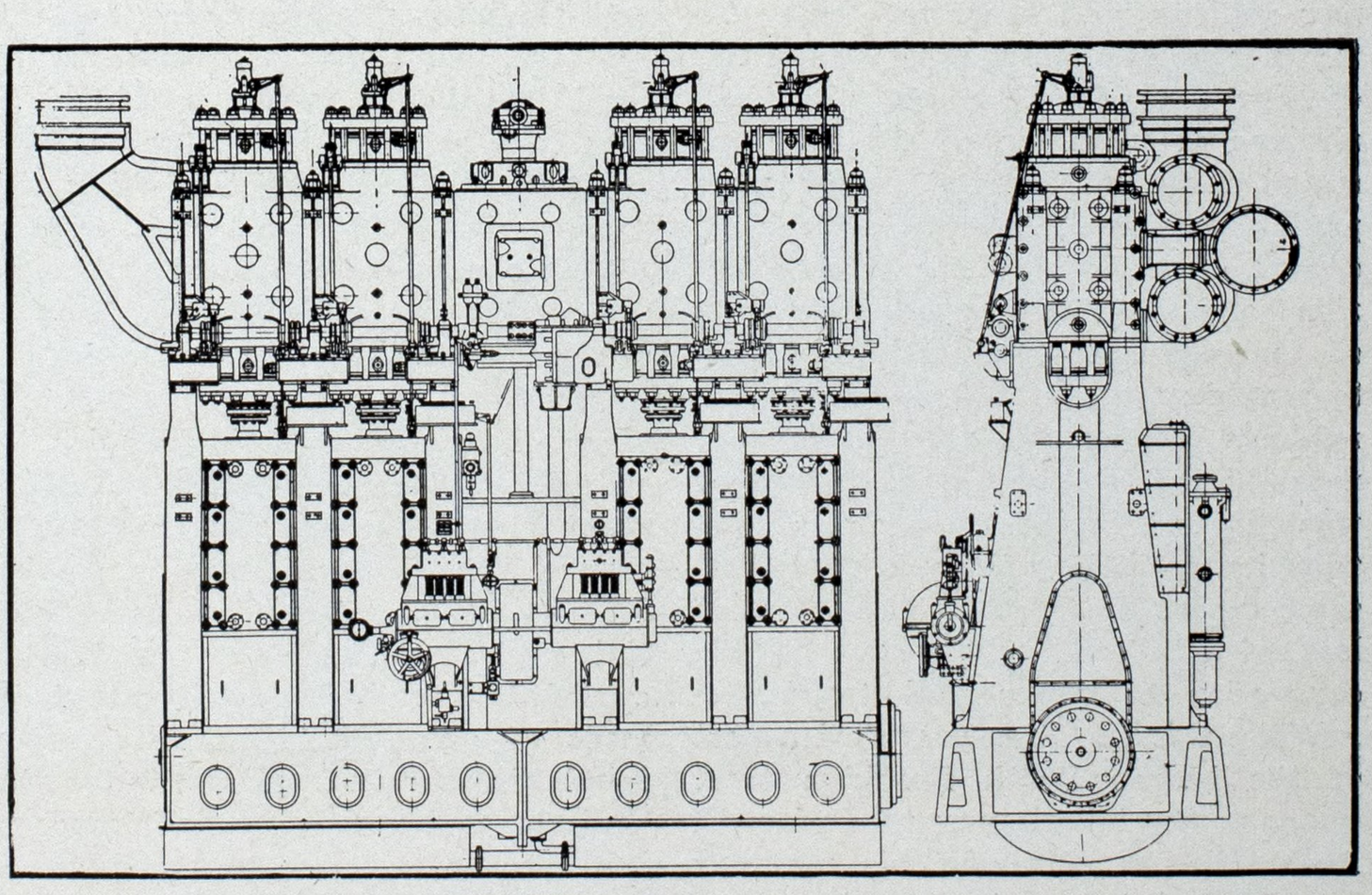
TWO large double acting diesel engines of M. A. N. type have recently been completed by the Hooven, Owens, Rentschler Co., Hamilton, O., for the United States shipping board's second diesel conversion program. These engines are of four cylinders, double acting, with air injection and port scavenging. The bore is 27½ inches and the stroke is 47¼ inches. Each engine develops 4000 brake horsepower at 110 revolutions per minute. The overall dimensions of the engine are, length, 32 feet; height, 26 feet; width, 16 feet and the weight is 720,000 pounds. It is interesting to note that this new Hamilton diesel engine develops 200 brake horsepower more at 5 revolutions per minute less and is 1 foot 6 inches less in height and weighs 148,000 pounds less, than the Hamilton M. A. N. double acting diesel engine that was installed in the shipping board freighter SEMINOLE and is now giving excellent performance.

The first of these two new diesel engines has completed the seven days' load run required by the shipping board with particularly gratifying results. The tests began at 6 a.m. Dec. 8 and officially ended at 6 a.m. Dec. 15. The engine was connected directly to an electric generator and the power was absorbed by a water brake. The writer witnessed the test for several hours during Dec. 12, and the impression gained was that no machinery could have worked with greater ease and smoothness. Approximately 4019 brake horsepower was developed at 110 revolutions. The fuel consumption, it is understood was within the limits of the guarantee. Nominal rated fuel consumption per brake horsepower per hour is 0.44 pound.

No one could fail to be impressed with the simplicity and compactness and ease of accessibility of every part of this new engine. It gave the appearance of thorough design, excellent workmanship, and materials of the highest kind. The builder has reason to be proud of this engine as an achievement of high order and its anticipated good performance in service should completely dissipate the notion that we are not able to build good diesel engines in the United States.

An interesting auxiliary feature in connection with the test of the engine was the practical test of a waste heat boiler operated by means of the exhaust gases from the engine. As much as 100-horsepower steam at 50 pounds pressure was developed by the boiler; and it is planned to equip the ships that receive these engines with boilers of this type. Provision, of course, would be made for using oil burners when the main power plant is shut down. Such a boiler does away with the need for an auxiliary donkey boiler.

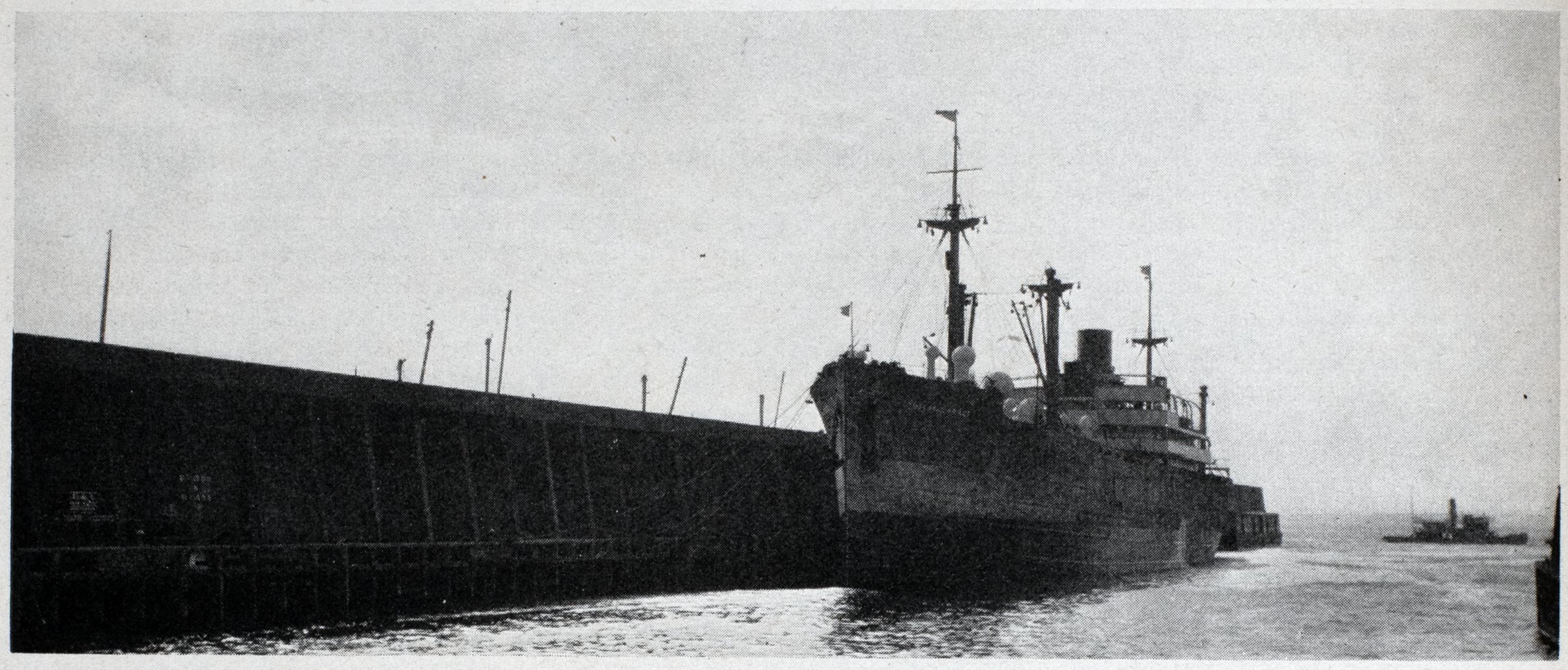
The two double acting diesel engines referred to above will be shipped to the Federal Shipbuilding & Dry Dock Co., Kearny, N. J. where they will be installed in the shipping board freighters, NEW ORLEANS and WICHITA as a part of the program of eight vessels for Diesel conversion.



DOUBLE-ACTING 4000 H. P. HAMILTON DIESEL UNDERGOES 7-DAY LOAD TEST

Dock Management Progress Section

How Successful Dock Operators Have Met
Problems of Giving Best Service to Ships



The Malayan Prince, one of the Five D Twin Seven Ships, Fastest in Far East Trade Loading at Bush Terminal, Brooklyn, N. Y. There is Room at Side of Pier for Two More Ships of Equal Size

Bush Terminal, Great Port Project Draws Shipping to New York

SOME 25 years ago a large part of South Brooklyn lying near the entrance of Gowanus bay was a sandy waste. Its only inhabitant was a fisherman who supplied a few summer patrons with boats and bait. To the north and east were the cities of New York and Brooklyn with their millions of inhabitants. At the time stated these millions of people were paying needlessly many millions of dollars annually for the transportation and distribution of all sorts of merchandise—needlessly because thoroughly systematized and economical methods of handling the things they required would have saved the money wasted under the hit-or-miss distribution facilities of the day, cumbersome methods resulting in deplorable loss of time and money due to the congestion of commercial traffic.

While this situation prevailed a part of the barren South Brooklyn tract came as an inheritance to Irving T. Bush. Before attaining his majority Mr. Bush had acquired business experience along industrial lines, his father being a wealthy manufacturer. His post-graduate course was a trip around the world in his father's yacht. After study of foreign ports and shipping methods there came to him the inspiration to transform his sand lots into a great terminal. It was a far cry from the solitary fisherman's shack to the thing Mr. Bush visualized—the establishment of a great economic unit in the wasteful transportation and distribution chaos of the country's largest metropolis. He saw the potential value of a location in touch with the splendid system of waterways in and about New York. Mr. Bush sought the counsel and aid of men prominent in industrial, commercial and financial circles. Incidentally, he thereby exploded a myth-the myth that judgment of men accredited with superminds in all that pertains to such projects as he had in mind, must be final. So far as Mr. Bush's purpose was concerned, it was, with them, a case of thumbs down from the very start. Mr. Bush had looked at his project from two angles. First, he had given consideration to what somebody said recently is the typical American viewpoint, namely, "Will it work?" and "Will it pay?" Second, he had urged that it would be a fine thing to do in that it would profit millions of people. The first proposition was regarded by industrial and financial interests as thoroughly impracticable and certain to end in failure. The second savored too strongly of idealism to appeal to the practical mind. Thus Mr. Bush, notwithstanding the sincere regard and esteem of his associates, was adjudged, insofar as this particular project was concerned, a dreamer and idealist. This was revealed when initial steps were taken by Mr. Bush in the face of every discouragement. They called his enterprise "Bush's Folly."

Picture the land as it appeared when inherited by Mr. Bush and compare it with the airplane view of

"Bush's Folly" as it looks today. The following paragraphs may be taken as so many units or steps in the edifice Mr. Bush has reared during the past 25 years:

Considered as a whole, the Bush terminal has been described as "the greatest consolidation in the world of every modern facility for the manufacture, storage and distribution of raw materials, manufactured goods and merchandise under conditions of maximum economy, efficiency and safety." Perhaps the keynote of this largest of the world's one-man ports is economic distribution. Traffic to and from Bush terminal is moved around the congested areas of New York instead of through them.

The Bush Terminal plant covers 200 acres on the water-front. There are 18 model industrial loft buildings containing more than 6,000,000 square feet devoted to tenant manufacture and distribution. The company rents buildings to 300 manufacturers. There are 125 warehouses for general storage purposes, these providing 26,000,000 cubic feet of storage space.

There is a battery of eight steamship piers with about 2,000,000 square feet of floor space. The piers will berth 35 steamers at a time. One is the largest double-deck covered freight pier in the world. The piers are under lease to companies operating 26 steamship lines serving some 85 of the world's ports. The American-Hawaiian Steamship Co., leases the big pier, which is 1250 feet long and 272 feet wide. The port of New York has a shore



Irving T. Bush

line of nearly 600 miles developed to handle ocean traffic, but the Bush terminal handles 20 per cent of all the export and import traffic moving through the port of New York.

The Bush terminal railway facilities include a fleet of locomotives and some 35 miles of track accommodating 1000 cars, the yearly average actually handled being 110,000 cars. By means of car floats owned and operated by the Bush Terminal Co., its road connects with all of the trunk line roads reaching New York. There is a union freight station in the terminal for the receipt and delivery of freight moving via trunk lines—facilities that are open to all shippers and receivers, irrespective of location.

The company operates a cold storage plant with 1,000,000 cubic feet of space. Commodities range from dry cell batteries to reindeer meat. There is a plant for the fumigation and sterilization of vegetables and other commodities from foreign countries when on the list of merchandise not to be distributed without this precaution. The terminal also has a bank, United States post office, offices of the American Railway Express Co., and Western Union Telegraph Co., a hospital, a Merchants' and Manufacturers' association, Young Men's Christian association and Young Women's Christian association.

The company has its own fire department, under the jurisdiction of the New York department. This unit includes the largest individual sprinkler system in the world. It was installed at a cost of $1,250,000.

The company erected in New York a handsome 30-story office building on



Lighterage and Railroad Receiving and Delivery Station for Bush Terminal Model Loft Tenants

forty-second street and a fine building on Broad street. A third large building is located in London, all of them distinguished for beauty in design and substantial, fire-resisting construction. The forty-second street building and that in London each represents an investment of about $3,000,000.

Concerning construction, Mr. Bush revealed at the outset the very practical side of his nature. He is among the pioneer builders in reinforced concrete, a science that was still the subject of debate and doubt when the first unit of the Bush plant was constructed. He was quick to see the enduring properties of concrete, and the first building was of that material. He made a concession to prevailing practice in but one instance by facing the concrete of a building with brick, but his modern buildings stand for what they are—reinforced concrete. The walls of the model loft building of steel and concrete are 80 per cent window area, thus providing an abundance of natural light and ideal working conditions. The Turner Construction Co., were the builders of the Bush terminal. William Higginson was the architect.

The story of the Bush terminal development would run into volumes if told in detail. Growth was accompanied by innovations and constant improvement. In its adminstration every resource that would profit its patrons was adopted. For example, space may be had by manufacturers and distributors in small or large units, each enjoying the advantages of co-operative effort. Electricity and live steam are supplied to tenants at rates below any charged elsewhere. Appreciation of the many advantages is shown by the fact that from the time the first building was erected average vacancy over that period has been less than one-eighth of one per cent—almost nothing.

The distribution division means a merchandising medium established to meet modern marketing methods required by manufacturers located at a distance from Eastern markets. In a sense it is a branch house or stock room, but without capital expenditure or fixed overhead. With overhead costs spread over hundreds of manufacturers the cost to each is very low. Regardless of location a manufacturer can place either a large or small stock of products in the distribution division. The service is so highly organized that delivery can be made to homes as well as to jobbers, stores and wholesalers. In the case of some products, including electric refrigerators of certain types, the company will not only deliver, but actually make installations.

Twenty-five years ago, Mr. Bush's terminal properties were assessed at $3,450,000. Today they are assessed at $36,350,000. Net earnings in 1926 exceeded $2,000,000. Today 30,000 workers enter the terminal during an average business day.

Through what Mr. Bush has defined as "organized co-operation," has developed the great enterprise known throughout the world as the Bush terminal. But notwithstanding the material results achieved, success has not dulled the idealism of the founder. "I believe," said Mr. Bush, "that nearly all constructive American business men have idealism and are a bit ashamed of it. They are apt to hide their ideals behind the hedge of commercialism." A year ago last December the twenty-fifth anniversary of the acquisition of the Bush terminal properties was celebrated. A bronze tablet, the conception of Senior Vice President R. G. Simonds, who has been associated with Mr. Bush for that period of time, was unveiled as a tribute to the founder. His speech of acceptance concluded as follows:

"When you pass this tablet in days to come, do not think of it as a tribute to me. Think of it as a token of your pledge and mine to give the world something worthy of our opportunity, and to leave behind us something better than we found. That is the spirit of America. Let us be humbly proud of our share in it."

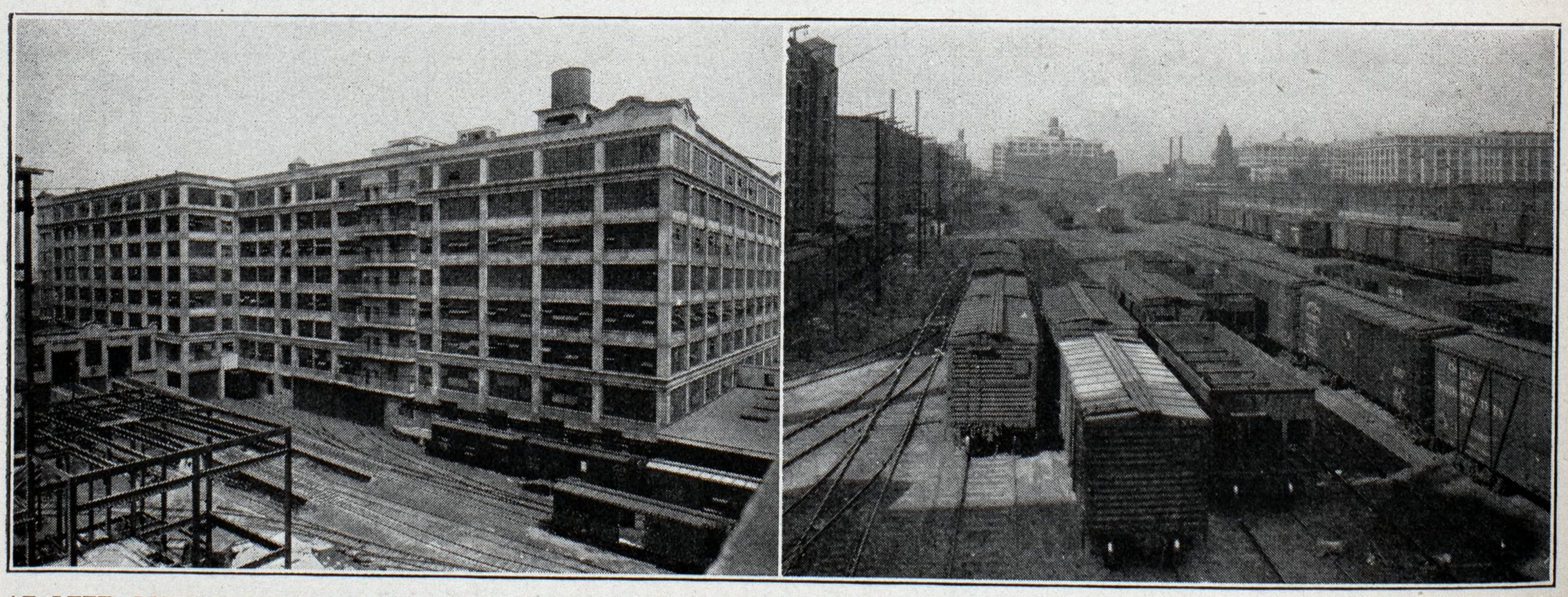
The Roaring Forties

From the Plymouth Cordage Co., North Plymouth, Mass., accompanying a beautiful calendar the following interesting commentary on the old sailing days has been received:

The subject of our calendar illustration for 1929 is a clipper of the early eighties, not so fast as the early racing clippers, but a very well modeled ship with large cargo capacity and strong rigging, capable of carrying on in heavy going, making twenty-four hour runs of two hundred to three hundred miles.

As all seafaring men know, "the roaring forties" applies to the latitudes of forty and fifty degrees south, the route commonly used by the Australian clippers when "running down the easting" in the region of the prevailing westerlies. The usual practice of ships out of New York was to run down south of the Cape of Good Hope until the strong westerly winds were reached, when a great circle course took them fairly well south, sometimes to the edge of the Antarctic sea. This course was followed by practically all ships up to the time of their passing.

We think Frank Vining Smith has done excellent justice to this subject and has brought us a picture full of action and great vigor.



AT LEFT—BUSH TERMINAL CO.'S BUILDINGS 22, 23 AND 26, SOUTH BROOKLYN, N. Y. AT RIGHT—BUSH TERMINAL RAILROAD CLASSIFICATION YARD AND IN BACKGROUND MODEL LOFT BUILDINGS

Use Gyro-Stabilizers

It is interesting to learn that the gyro-stabilizer, for dampening and practically eliminating rolling, is being adopted for a number of the larger yachts now under construction. Two yachts building at Pusey & Jones, Wilmington, Del., for Fred J. Fisher and Alfred E. Sloan Jr. of Detroit are to be fitted with gyro-stabilizers. These yachts are ocean going vessels and are 235 feet long with a displacement of 1200 tons. The design is by John H. Wells in association with Cox & Stevens. Gyro-stabilizers are also being installed on Harold Vanderbilt's 150-foot express yacht building at the Herreshoff Mfg. Co. and in the 160-foot yacht building at George Lawley & Sons for R. W. Judson of Detroit. The latter yacht is designed by Henry J. Gielow Inc.

Tanker Brandywine Sold

The tanker BRANDYWINE was sold Dec. 13 to Stanley Hiller and J. J. Coney of San Francisco for the sum of $60,000. The terms were 25 per cent cash and the balance in five equal annual installments. The vessel is of 7047 deadweight tons now laid up at Mobile, Ala.

Board Sells 45 Vessels

Sale of 45 vessels averaging 5000 deadweight tons each for the sum of $423,600 to the Union Shipbuilding Co., Baltimore, with the understanding that the ships will be completely scrapped and dismantled within 18 months, was approved by the shipping board Dec. 13. This action was taken following receipt of competitive bids for these vessels on Dec. 11.

The vessels are laid up as follows: James river, 23; New York, 5; Philadelphia, 2; Mobile, Ala., 2; New Orleans, 5; Orange, Tex., 8. Sale of these vessels leaves less than 450 vessels in the board's laid-up fleets.

Good Stevedoring Attracts Business

BY H. A. RHATIGAN

STEVDORING is undoubtedly the chief factor entering into the handling of freight for ocean transport. For many years officials of the Grace line have realized this fact and have consequently given much attention to the development of an efficient system for loading and unloading cargoes consigned for ocean transport by their ships. As a result of an intensive study of this problem as well as from long experience with various conditions arising from time to time, this company has built up a stevedoring organization that functions smoothly and skillfully with the assistance of the most modern equipment and under the capable direction of Ernest Bijou, pier superintendent, and his assistant W. F. Hayes.

Stevedoring Problems Analyzed

This line offers exceptional possibilities for the analysis of stevedoring method and practice for the cargoes handled are more than usually diversified, ranging all the way from heavy bulky machinery and structural steel to fragile packages requiring the greatest care in loading and stowage. It has established a reputation for proper methods of handling freight and for service to shippers by utilizing every facility for improvement. The results are evident in the progressive strides made during the past years in securing and retaining a large volume of traffic passing through New York for foreign markets.

A reference to the dictionary gives the definition of the word "stevedore" as a man whose occupation is to stow goods in ships for transport, one who loads or unloads ships at shipping point or at place of arrival abroad. The American stevedore has contributed largely to the successful introduction of American manufactured merchandise into Europe, Asia, Latin America and all other sections of the world.

On Stevedore Rests Responsibility

To show the importance of the work of the stevedore, it is a matter of record that from 1904 to 1914 over 372 vessels were totally destroyed and more than 3548 partially destroyed because of improper stowing of general merchandise. The loss of wealth involved in this destruction of merchandise and cargo carriers is great, and the responsibility for such loss rests directly upon the broad shoulders of the stevedore who in the light of shipping records has a real man's size job on his hands.

The stevedore's troubles begin on the arrival of the cargoes at the pier. Especially valuable cargo must be first separated from the rest of the material for shipment and placed in a special storeroom. When this is taken care of, proper separation must be made of all the cargo. As a general rule, the heavy merchandise, such as iron, and steel rails, is reserved for the bottom of the hold, while much lighter articles are kept for utilization as upper cargo. Then there is further separation of material made in accordance with the vessel's list of ports of call.

It has been said that a certain South American merchant who had given his order to an American firm for a miscellaneous cargo of machinery, was very much startled one morning to see piled up in his warehouse an ugly row of forbidding-looking boxes, which upon closer investigation, turned out to be a shipment of coffins. Needless to say the merchant was very angry, and as he did not have a particularly strong sense of humor the incident turned out decidedly embarrassing to everybody concerned, including the stevedore in charge of the vessel's loading.

Stevedoring is a comparatively easy matter when the cargo consists of a single commodity destined for a single port—grain for Liverpool, for example—but in concerns like W. R. Grace & Co. and the Grace Steamship lines, where general cargo is carried, and when on an average there are ten and sometimes fourteen ports of call—(prior to the opening of the Panama canal as many as thirty ports of call) the question of proper stowage becomes a highly complicated affair.

Stow Cargo for Accessibility

Cargo must be stowed in a vessel so that it is readily accessible for each of the ports of call with a due regard, of course, to certain dangerous conditions obtaining when certain cargo is placed in juxtaposition to other cargo. For instance, flour or sugar must not be placed near oil, and local and other commodities emitting gases must receive the proper ventilation to prevent explosion. Malodorous articles such as oakum, render foodstuffs unsalable. The clever stevedore carries around in his head a formidable list of dangerous articles that to the average layman would pass without suspicion.

Labor is one of the expensive items

(*Continued on Page* 60)

This interesting and clear statement of the underlying principles of good stevedoring and its effect on cargo handling efficiency is reprinted from a recent issue of the Grace Log, through the courtesy of its Editor W. P. Bieser. The author is attached to the traffic department of W. R. Grace & Co.

Two West Coast Vessels Sold by Board

Sale of the last two government-owned cargo ships held on the Pacific coast in the laid-up fleet has been authorized by the shipping board. The last cargo services on the coast were sold by the board early this year.

The ships are the S. S. DIABALO, a steel cargo vessel of 9656 deadweight tons, and the S. S. MOHINKIS, a steel cargo vessel of 9637 deadweight tons. These are to be sold to the General Engineering & Dry Dock Co., San Francisco, for $25,000 each, payable 25 per cent cash and the balance in five equal annual installments. The purchaser agrees to substitute new engines for the present turbine engines of the vessels. In the case of the MOHINKINS, it is provided that the present engine shall be removed and a 2800 indicated horsepower reciprocating engine be installed in its place. In the case of the DIABALO, the purchaser may substitute for the present engine either a 2800 indicated horsepower reciprocating engine or a suitable diesel engine, the specifications of which will be approved by the shipping board. The estimated cost of installing new reciprocating engines is $100,000 for each ship.

Sale of the S. S. CHICKAMAUGA and the S. S. WEKIKA to C. D. Mallory, New York, for the lump sum of $60,000 cash was approved by the shipping board Dec. 12. The purchaser agrees to perform certain betterments including installation of a new 2000 indicated horsepower reciprocating engine in the CHICKAMAUGA, at a total cost of not less than $120,000. The vessels are of 5591 and 5621 deadweight tons respectively. The CHICKAMAUGA is laid up at Norfolk and the WEKIKA is at New York. When made ready for sea they will be used in tramp ocean service.

Rumor has it that many of the dry dock and ship repair companies in New York harbor, excepting the Todd Shipyards Corp. are to be merged under one head to be known as the United Dry Dock & Ship Repair Corp. of New York. The merger if carried out would include properties in Brooklyn, Hoboken and Staten Island, valued well up in the millions in real estate and equipment.

Yards said to be included in the proposed merger are; James Shewan & Sons, Morse Dry Dock & Repair Co., Theodore A. Crane Sons Co., Ira A. Bushey & Son, Inc., W. & A. Fletcher Dry Dock & Repair, Staten Island Shipbuilding, New York Harbor Dry Dock Co., Brewer Dry Dock Co., S. I. & Perth Amboy Drydock.

The shipping board on Dec. 18 authorized the negotiation of a lease with the Bay State Shipping Co., Boston for operation of the shipping board terminals at that city.

Saratoga Sets New Mark for High Speed

During November the United States airplane carrier LEXINGTON, in a test run, made a speed of 34.82 knots. Word is now received from San Pedro, Calif., that the SARATOGA, a sister ship of the LEXINGTON, has exceeded this record. The SARATOGA achieved a rate of 34.99 knots, or approximately 40.5 miles per hour. Both vessels are equipped with electric drive furnished by General Electric Co.

In order to develop this speed for a vessel of such great weight (33,000 tons), the motors had to supply 215,581 horsepower to the propeller shafts. It is estimated that, at this rate of speed, it would be impossible to stop the ship in a distance of much less than a mile.

W. C. Watson, General Electric engineer, who was on board the LEXINGTON during the trials when she established her record, said that the airplane carrier behaved in somewhat the same manner as a speed boat when at its greatest speed: the fore part of the vessel was lifted, while the stern settled low in the water.

It has been estimated that, could transatlantic passenger liners maintain a constant speed equal to that developed by the SARATOGA, the crossing from New York to Queenstown could be accomplished in three days and 17 hours.

What the British Are Doing

NOVEMBER has proved to be the best month for a long time for the placing of orders with Clyde shipyards. The aggregate of 24 vessels, or about 150,000 tons, is the largest reported for many months and the employment outlook has improved considerably although some time must elapse before actual work is started on the larger vessels ordered recently. The most important vessel was the Canadian Pacific liner EMPRESS OF BRITAIN which is being laid down by John Brown & Co. and the largest orders given for general trading vessels were those allocated by H. Hogarth & Sons, Glasgow for six steamers to be built at four different yards. The November launches all over Scotland consisted of 18 vessels of 57,683 tons—12 of 56,602 on the Clyde, four of 151 tons on the Forth and two of 930 tons in the Aberdeen area.

* * *

THE repair ship RESOURCE which was launched by Vickers Armstrong Ltd. at Barrow in Furness, Nov. 28, is the second vessel of the Royal navy to bear the name. The first was a sixth-rate ship of 603 tons displacement, and she carried 28 guns. She was built on the Thames and launched Aug. 10, 1778. After useful service chiefly in the West Indies she was converted into a troop ship in 1801, and during the period 1803 to 1806 equipped as a floating battery she was stationed in the Lower Hope and manned by Trinity House for the defense of the Thames during the threatened invasion by Napoleon. In April 1806 she was renamed ENTERPRISE and stationed off the Tower of London as a receiving ship. Ten years later she was sold. The new RESOURCE is a bigger and much more important vessel. Her length between perpendiculars is 500 feet, and her geared-turbine propelling machinery is designed to develop 7500 shaft horsepower. Her most impressive feature is, however, the comprehensive character of her facilities for the repair of ships and their machinery. The various shops on board are equipped with the latest types of electrically operated machine tools, and to provide the current required for them diesel-driven and turbine-driven generators are installed with a total capacity of 2300 kilowatts.

* * *

THE Fairfield Shipbuilding & Engineering Co. Ltd. of Glasgow will launch on December 12 the light

cruiser NORFOLK built to the order of the British government. It belongs to a class of vessels each 590 feet in length between perpendiculars, 630 feet overall, of 10,000 tons standard displacement and about 14,000 tons full load displacement. Their armament will consist of eight 8-inch and four 4-inch guns and eight torpedo tubes. The main propelling engines of the NORFOLK will consist of geared turbines, but there will be two diesel engines for cruising purposes. Other three vessels of the NORFOLK and DORSETSHIRE type which represent certain modifications on the original LONDON class are to be laid down at the rate of one each year.

* * *

THE motor ship IRANIA launched Nov. 30 by the Blythswood Shipbuilding Co. Ltd., Scotstoun, is the first vessel to be equipped with an internal combustion engine of wholly British design and manufacture. The makers of the engine, Richardsons Westgarth & Co. Ltd., Hartlepool, claim that the cost of the machinery is only 60 per cent that of comparable diesel installations of foreign origin, and it has also working advantages and economies of space. The new engine has been produced after much research and experiment by W. S. Burns, an engineer of the firm. It is of the double acting two stroke type and has three cylinders instead of the usual six cylinders of the normal marine diesel. The engine is fitted with a new system of fuel injection which brings all the intricate parts immediately under the observation of the engineer operator. Mr. Burns believes that the engine can be constructed without difficulty.

Ocean Freight Rates

Per 100 Pounds Unless Otherwise Stated

Quotations Corrected to Dec. 18, 1928 on Future Loadings

NOTE: FREIGHT RATES STEADY WITH SLIGHT CHANGE

New York to	Grain	Provisions	Cotton (H. D.)	Flour	General cargo cu. ft.	General cargo 180 lbs.	††Finished steel	REMARKS Freight Offered
Liverpool	3s 3d	$0.60	$0.45	0.20	$0.50	$0.90	$8.00T***	Fair
London	3s 3d	0.60	0.45	0.20	0.50	0.90	8.00T***	Fair
Oslo	$0.14	0.45	0.50	0.30	0.42½	0.85	8.00T	Fair
Copenhagen	0.12	0 45	0.50	0.30	0.50	1.00	8.00T	Fair
Hamburg	0.16	0.35	0.45	0.24	0.50	0.90	10.00T	Good
Bremen	0.14	0.35	0.45	0.24	0.50	0.90	10.00T	Very good
Rotterdam and Amsterdam	0.16	0.32½	0.45	0.24	0.45	0.80	9.50T	Good
Antwerp	0.17	0.32½	0.45	0.25	0.45	0.80	9.50T	Good
Havre	0.20	0.55	0.31	0.30	0.45	0.80	9.00T	Very good
Bordeaux	0.20	0.55	0.31	0.30	0.45	0.80	9.00T	Very good
Barcelona	....	0.50	0.30	10.00 bags	—12 00T—		10.00T	Poor
Lisbon	....	0.65	0.45	8.00T bags	—23.00T—		8.00T	Fair
Marseilles	....	0.65	0.40	7.00 bags	—23.00T—		8.00T	Fair
Genoa	0.18	14.25T	0.50	9.00	—23 00T—		11.50T	Fair
Naples	0.18	14.25T	0.50	9.00	—23.00T—		11 50T	Fair
Constantinople	0.27	20.00T	0.75	0.40½	—24.00T—		11.50T	Good
Alexandria	....	20.00T	0.75	0.40½	—24 00T—		11.50T	Good
Algiers	....	0.75	0.60	8.0T bags	—23.00T—		11.50T	Fair
Dakar	....	17.00	....	15.50T	—23.00T—		11.50T	Fair
Capetown	....	18.00	....	13.00 per 2240 lbs.	20.00		20.00	Fair
Buenos Aires	....	22.00T	....	....	20.00 to 22.00T†		8.00 to 8.80T	Good
**Rio de Janeiro	....	22.00T	....	....	20.00 to 22.00T†		7.00 to 7.70T†	Good
Pernambuco	....	22.00T	....	9.00T	—22.00T—†		9.70T†	Good
Havana	0.30*	0.50	....	0.30*	0.61	1.33	10.00	Fair
Vera Cruz	0.35	0.40	0.50	0.35	x		0.25 to 0.35	Very fair
Valparaiso	....	1.07	....	0.70	....	....	10.00T	Fair
San Francisco	....	0.45 to 0.90	....	0.40 to 1.10	....	....	0.25 to 0.30	Very good
*Sydney	....	22.50T	1.25	22.50T	17.50 to 27.50T		9.50 and 12.50	Fair
Calcutta	....	....	0.60	10.00T	—16.00T—		10.00T	Good

From North Pacific Ports to	Lumber Per m. t.
San Francisco	$4.25 to 4.50
South California	4.50 to 5.00
Hawaiian Islands	9.00 to 10.00
New Zealand	15.00 to 18.00
Sydney	11.00 to 13.50
Melbourne-Adelaide	12.00 to 14.00
Peru-Chile	11.75 to 14.00
South Africa	17.00 to 20.00
Cuba	14.00 to 15.00
United Kingdom	62s to 65s
Baltimore-Boston range	$12.00 to 14.00
Florida Range	17.00
Buenos Aires	14.00
South America — East Coast	14.00 to 20.00
South America — West Coast	12.00 to 14.00
China	12.00 to 13.00
Japan	10.00 to 10.50
Japan (logs)	12.00 to 14.00

Flour and Wheat

U. K. and Continent (gross tons)	34s to 35s
Oriental Ports (net tons)	$4.25 to 5.00

T—Ton. ‡Per quarter of 480 lbs. †Landed. ††Heavy products limited in length. *Extra charge for wharfage.
**Plus $0.50 surcharge on all rates to Rio de Janeiro on account of congestion. ***Plus 15 per cent.
xNo general cargo rates to Vera Cruz.
*Flour to Sydney—$22.50. General cargo—$17.50 to $27.50 Finished steel—$9.50 and 12.50.

NOTE: Lighterage rates on fuel in New York reduced from 6½ to 5½c per barrel. The coal strike in Britain is now settled and freight rates or bunker prices for coal or pig iron are again quoted.

General cargo rates to Havana change daily and are omitted for the time being.

Rates to Calcutta are subject to change without notice. Cotton goes only to Bombay. Landing charge of $2.00 per freight ton at Valparaiso.

Principal Rates To and From United Kingdom

	s	d
Grain, River Plate to United Kingdom	24	0
Coal, South Wales to Near East	12	6
Coal, United Kingdom to Buenos Aires	13	6
Manganese Ore, Poti to Philadelphia	$3.80	
Pig iron, United Kingdom to New York or Philadelphia	12	6
Iron ore, Bilbao to Cardiff	5	9
Iron ore, Huelva to Phila. or Balto	11	0

Bunker Prices

At New York

	Coal alongside per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Feb. 20. 1928.	5.25@5.60	1.40	4.92
Mar. 20	5.00@5.60	1.40	4.92
April 19	5.00@5.60	1.40	4.92
May 19	5.00@5.60	1.30	4.92
June 19	5.00@5.60	....	4.92
July 18	5.00@5.60	1.10	4.92
Aug. 18	5.00@5.60	1.10	4.92
Sept. 18	5.65	1.10	4.92
Oct. 18	5.65	1.10	4.92
Nov. 20	5.00@5.65	1.10	4.92
Dec. 18, 1928.	5.00@5.65	1.10	4.92

At Philadelphia

	Coal trim. in bunk per ton	Fuel oil alongside per barrel	Diesel Eng. oil alongside per gallon
Feb. 20, 1928.	5.25@5.60	1.21@1.25	4.90@5.12
Mar. 20	5.00@5.60	1.21@1.25	4.64@4.87
April 19	5.00@5.60	1.21@1.25	4.64@4.87
May 18	5.00@5.60	1.20@1.25	4.87
June 19	5.00@5.60	....	....
July 18	5.00@5.60	1.10	4.88
Aug. 18	5.00@5.60	1.10	4.88
Sept. 18	5.65	1.00	4.88
Oct. 18	5.65	.95@1.00	4.88
Nov. 20	5.65	.95	4.88
Dec. 18, 1928.	5.00@5.65	1.05	4.88

Other Ports

Boston, coal, per ton	$6.12
Boston, oil, f. a. s., per barrel	1.21
Hampton Roads, coal, per ton, f.o.b., piers	$4.25 to 4.50
Oct. 7 — Cardiff, coal, per ton	12s 9d
London, coal, per ton	—s —d
Antwerp, coal, per ton	18s 6d
Antwerp, Fuel oil, per ton	80s0d
Antwerp, Diesel oil, per ton	87s 6d
British ports, Fuel oil	67s 6d
British ports, Diesel oil	82s 6d

Stability Regulations Are Agreed Upon

A study of ship stability, which should prove useful to the entire maritime world, has been completed and the results embodied in a comprehensive report presented to the executive board of the American marine standards committee at its meeting on Nov. 17. The report was approved, and its recommendation for regulations affecting stability and the loading of ships is now an American marine standard according to word received from A. V. Bouillon, secretary of the American marine standards committee.

A special committee was appointed four years ago to make a study of stability. A tentative report was presented two years ago in which it was recommended that certain regulations be established. Copies of this report were widely distributed to shipbuilders, ship owners and naval architects both here and abroad with a request for criticism and comment. Many constructive and helpful analyses were received which were carefully considered by the special committee in formulating its final report.

The regulations contained in the report are to apply to every passenger or ferry vessel of 500 or more gross tons or which intend to carry 50 or so passengers and coming under the rules of the United States steamboat inspection service, the keel of which is laid on or after July 1, 1929. The purpose of the regulations is to properly standardize the method of design and inspection of all types of vessels from the standpoint of their stability. By following the regulation a safe degree of stability will be insured.

Mr. Bouillon called attention to the particular importance at this time of this report on stability, which is the result of a great deal of work by America's ablest mind, in view of the approaching conference for safety of life at sea to be held in London this spring.

Repair Work Placed

The Robins Dry Dock & Repair Co., Brooklyn, N. Y., recently was successful, through being low bidder, in obtaining two important reconditioning jobs.

Contract was awarded to completely restore the United States army dredge NAVESINK in 70 days for the sum of $233,887. Other bids varied from $269,936 to $295,300; and the time from 80 to 105 days.

The NAVESINK sank off Staten Island, N. Y., May 7, following the collision with the British steamer SWINBURNE, with a loss of 22 members of the dredge. From that time on until Sept. 26, the dredge had remained under water when it was raised and towed to the army base on the Brooklyn shore.

An order has also been received for reconditioning the Porto Rico liner, PONCE which sank while undergoing repairs in another yard. The bids were as follows: Robins Dry Dock & Repair Co., $183,000; Tietjen & Lang Dry Dock Co., $196,260; W. & A. Fletcher Co, $219,500; Morse Dry Dock & Repair Co., $235,370; New York Harbor Dry Dock Co., $253,461; James Shewan & Son Co., $239,736; and Staten Island Shipbuilding Co., $242,019.

The Crandall Engineering Co., specializing in the design and building of railways and floating drydocks, has moved from its location on Border street in East Boston to the company's new office building, 134 Main street, Kendall Square, Cambridge, Mass.

Contract for Icebreaker

Contract for the new icebreaker for service on the St. Lawrence river is to be awarded to the St. John Dry Dock Co., according to declaration made by officials of the department of marine and fisheries, Dec. 4. The award of this contract disposes of the two icebreakers, estimates for which were made in provisions last spring. The first icebreaker awarded was given to the Halifax Shipyard for operation in Hudson Straits.

Vulcania on Maiden Trip

The VULCANIA, new Cosulich motor liner and sister ship of the SATURNIA was to have left on her maiden voyage from Trieste to New York on Dec. 19, to set out on her return voyage from New York, on Jan. 10.

The VULCANIA is 632 feet long 80 feet beam and 92 feet in depth, from keel to flying bridge. She is propelled by Burmeister & Wain diesel engines developing 33,000 shaft horsepower and giving her a speed of 21 knots. Carrying a crew of 660 men, the new vessel will have accommodations for 380 first class passengers, 460 second, 400 intermediate second and 700 third class passengers.

On Nov. 23, at the monthly meeting of the directors of the Todd Shipyards Corp., the regular quarterly dividend of $1 per share was declared, payable Dec. 20 to stockholders.

Diesel Electric Drive for Ferries, Light Ships

Two, double ended, steel, diesel ferry boats are being built for service between New York city and Ward's Island. When completed this will make twelve electric ferry boats operating in New York harbor. Of these, eight will have diesel engine driven generators.

The two new ferries will each have two 6-cylinder Winton diesel engines of 250 brake horsepower each, driving a direct current generator at 160 kilowatts and 250 volts at 325 revolutions per minute. Each boat will have one 400 horsepower propulsion motor of 500 volts at 180 revolutions per minute. Control of the electrical equipment is to be of the variable voltage type. All of the electric equipment is to be furnished by the General Electric Co. These ferryboats were designed by Eads Johnson, New York. They are expected to go into service in the spring.

The lighthouse department has ordered three new light ships to be fitted with diesel electric power. The new vessels are to be built by the Charleston Drydock & Machine Co., Charleston, S. C. The official names for the new boats will be Nos. 115, 116 and 117. They are to be constructed of steel and will have an overall length of 133 feet 3 inches, a beam of 30 feet, a depth of 15 feet and a displacement of about 630 tons.

For power four 75 kilowatt Winton diesel engine generating sets are to be used. Only one of these sets is needed to furnish sufficient power for all auxiliaries when the vessel is at its station. All four sets will only be needed when the vessel is under way. The propeller on each boat will be driven by one 350-horsepower, 300 revolutions per minute, double armature motor, power for which will be supplied by the four generators connected in series. All of the electrical equipment is to be furnished by the General Electric Co.

For Safety at Sea

The American delegation to the conference of the maritime powers of the world to be held in London this spring, will submit an international code of sea laws intended for the saving of lives at sea. An appropriation of $100,000 requested by President Coolidge resulted in legislation which is now pending in congress for participation of America in the international conference for the revision of the convention of 1924 for the safety of life at sea.

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

SEAMEN on a vessel in the hands of a vendee under a conditional sale agreement are entitled to a lien for wages, it was held in the case of S. W. SOMERS, 22 F. (2d) 448, notwithstanding a clause in such agreement providing that the vendee has no authority to create liens for wages, supplies, or repairs.

* * *

WHEN a barge moves alongside a pier, she is bound to put out no more lines than are necessary for her own weight, it was said in Osterhoudt v. Federal Sugar Refining Co., 22 F. (2d) 475. On the other hand, continued the court, if another barge moors outside of her, she is bound not to overcharge the fasts of the first, and if she does she is liable. This duty involves acquainting herself with the size, condition, and number of the lines to the pier, and is not affected by the fact that the berth is assigned to her, unless she has not sufficient lines of her own and protests. Prima facie she is at fault, for the inside barge owes her no duty to strengthen her own position. However, the inside barge may by acquiescence accept the situation, and, if so, she shares the fault.

* * *

A SHIPOWNER cannot avoid liability for injury to a seaman by a defective appliance, on the ground that the seaman knew of the defect.—Grant v. United States Shipping Board Emergency Fleet corporation, 22 F. (2d) 488.

* * *

SEAMEN, constituting in excess of one-third of a crew, who missed their vessel intentionally, hoping thereby to delay sailing, giving them the opportunity to celebrate Christmas eve and possibly Christmas day ashore, were not deserters, but did breach their contracts, and there was no duty on the part of the master to keep their places open for an indefinite period, even after notice that they were attempting to rejoin, and the vessel was liable for no more than the wages earned by each man up to the time of leaving, less advances, but was liable for such amounts.—Buchanan v. United States, 24 F. (2d) 528.

* * *

A WRECKED vessel after abandonment has no owner.—*In re* Highland Navigation Corporation, 24 F. (2d) 582.

* * *

IT IS well settled that a shipowner whose vessel has been wrecked and sunk without his fault has a right to abandon it, and that after abandonment he is not under any obligation whatsoever to raise or remove it, and is not personally liable for the expense of removal. "This is so," said the court in the case of *In re* Highland Navigation corporation, 24 F. (2d) 582, "though an act of Congress (Rivers and Harbors act March, 1899, §20) authorizes the secretary of war to remove obstructions to navigation, and provides that the expense shall be a charge upon the vessel raised by the government, and that, if the owner fails to reimburse the United States for such expense within a certain time after notification, the vessel may be sold and the proceeds covered into the treasury of the United States. The exemption from liability after abandonment arises under the general maritime law. It, therefore, cannot be qualified or impaired by state legislation or municipal ordinance."

* * *

MASTER of a vessel held, in case of Fort Gaines, 24 F. (2d) 438, to have no maritime lien for wages earned after seizure on legal process.

* * *

IT IS the duty of a ship initially to exercise due diligence to furnish a stevedore with a safe place to work, and she cannot escape liability by showing that a competent stevedore was employed at the loading port when the accident occurs in loading (in this case from the breaking of an unsound dunnage plank).—Munson Steamship Lines v. Newman, 24 F. (2d) 416.

* * *

IT IS settled law that, where no time is specified in a contract of carriage by sea, there is an implied obligation or warranty that the shipowner will make delivery within a reasonable time, measured by the period of transit, and also that his obligation is to provide a vessel to perform that contract within reasonable time. He is liable in damages for a failure to do so, unless excused by some term of his contract or some principle of law. In the case of W. A. Lighter & Co. v. United States Shipping Board, 24 F. (2d) 536, this rule was applied, and it was held that, where a ship was seaworthy when she sailed for the loading port to receive a transatlantic cargo, but developed engine trouble on the way, which made repairs necessary before commencing the voyage, and such repairs were promptly commenced at the loading port, but delayed after cargo was loaded by a general machinists' strike, the shipowner was not liable for a consequent delay in delivery of the cargo, under a provision of the bill of lading exempting it from liability for delays not reasonably avoidable or caused by strikes.

* * *

THE scope of a voyage may include ports not exactly in the ordinary track of the specific voyage, but not those far outside or beyond the ordinary track. Applying this principle, the court, in the case of Hamilton v. United States, 24 F. (2d) 586, held that under bills of lading giving a steamship liberty "to proceed to and use any port or ports in any rotation for any purposes whatsoever, whether in or out of, or beyond, the customary or advertised route, and all such ports shall be deemed to be included in the intended voyage," the fact that the ship went 168 miles out of the customary and direct route, which was 3400 miles in length, to take an additional cargo, was not a deviation.

* * *

THE case of a vessel maneuvering to leave her slip is one of special circumstances. Therefore ordinary steering and sailing rules and signals made for vessels navigating on definite courses do not apply.—SOCONY No. 19, 24 F. (2d) 653.

Up and Down the Great Lakes

Lake Navigation Closes—Lake Levels—Order Two Electric Carferries—Foreign Ships on Lakes—Two Bulk Freighters

GREAT LAKES navigation closed for the season Dec. 12 at the Canadian head of the lakes with six American and Canadian vessels departing with final grain cargoes for the lower lake ports. The locks at Sault Ste. Marie were closed on Dec. 15, and lights in aid of navigation were withdrawn as traffic between Lakes Superior and Huron was ended for the winter season. Shipping insurance rates expired Nov. 31, but the generally accepted date for tying up of lake boats is Dec. 15.

Several efforts in recent years to close traffic on the upper lakes by Dec. 1 have met with no definite results. Losses by storm before Dec. 15 usually are negligible. During the late 1928 season lake vessels met with no destructive weather. Five ships were lost in a blizzard in the previous December. One of the most destructive lake storms occurred in November 15 years ago, when storms lashed Lakes Superior, Huron and Michigan.

The last vessels on the Great Lakes to load with iron ore for lower lake ports sailed from the upper lake region on Nov. 27. These were the PERSEUS, which took a cargo from Superior, Wis., to Indiana Harbor, Ind., the steamer J. J. SULLIVAN, which left Superior with a cargo for South Chicago, and the CARMI A. THOMPSON, which sailed from Escanaba, Mich., on that date with the last cargo to come to Lake Erie ports.

Twenty-five cargoes of iron ore were received at South Chicago, Gary, Ind., and Indiana Harbor after Nov. 20 of which 13 docked at South Chicago, seven at Gary and five at Indiana Harbor. Receipts of limestone after that date at those ports and at the docks of the Universal Portland Cement Co., at Buffington, Ind., numbered 20 cargoes. Of that number, nine were received at South Chicago, three at Gary, five at Indiana Harbor and three at Buffington. The total tonnage of ore, limestone and coal passed over the docks for steel mills in the Chicago district during the 1928 season, set a new high record.

Shipments of iron ore from lake ports inland to blast furnaces during the first 25 days of November aggregated 40,025 cars, against 17,161 cars in the corresponding period in the previous year.

Insurance on cargoes of grain went up to peak figures in the first ten days of December. In the first few days of the month Fort William and Port Arthur, Ont., harbors cleared 30 grain vessels with nearly 7,000,000 bushels. From the opening of the lake navigation season in 1928 to Dec. 9, 325,000,000 bushels of grain were shipped out of those ports.

November Lake Levels

The United States Lake Survey reports the monthly mean stages of the Great Lakes for the month of November as follows:

Lakes	Feet above mean sea level
Superior	603.39
Michigan-Huron	580.61
St. Clair	574.98
Erie	571.73
Ontario	245.67

Lake Superior was 016-foot lower than in October and it was 0.87-foot higher than the November stage of a year ago. Lakes Michigan-Huron were 0.16-foot higher than in October and they were 1.71 feet higher than the November stage of a year ago, 1.25 feet above the average stage of November of the last ten years. Lake Erie was 0.13-foot lower than in October and it was 0.64-foot higher than the November stage of a year ago. Lake Ontario was 0.09-foot lower than in October and it was 0.82-foot higher than the November stage of a year ago, 0.57-foot above the average stage of November of the last ten years.

Order Five Lake Ships

Commencing next April, delivery of the five Great Lakes vessels ordered by Patterson Steamships, Ltd., from Swan, Hunter & Wigham Richardson, Newcastle-on-Tyne will be made.

The new lakers are to be about 260 feet long with a beam of 45 feet. Grain-carrying capacity will be about 100,000 bushels.

Barge Canal Traffic

Figures compiled by Thomas F. Farrell, commissioner of canals and waterways, indicate that the tonnage for the New York state barge canal has passed the 3,000,000-ton mark for 1928. Movement in grain for the past season has been the greatest of any year since 1924. Prior to Nov. 17, the canal carried 40,000,000 bushels of grain as compared with the 29,000,000 bushels handled during the same period in 1927.

Change to Self Unloader

During the winter the steamer SIERRA of the Tomlinson fleet will be converted to a self-unloader at the yards of the L. D. Smith Dock Co., Sturgeon Bay, Wis. The vessel is to be equipped with an L. D. Smith patent unloader. Conversion will be completed and the vessel is expected to be ready to sail by April 15, 1929.

Built in 1896, the SIERRA is 438 feet long at keel, 52 feet beam and 28 feet deep.

New Lighter for Soo

Built of arch construction at the yard of the Great Lakes Towing Co., the lighter RESOLUTE, formerly the barge MANDA is to be stationed at the Soo. With a capacity of 5500 net tons, the lighter has three cargo compartments.

In tow of the tug T. C. LUTZ, the RESOLUTE left Cleveland, Nov. 24, for Port Huron where the wrecker FAVORITE will tow her to the Soo.

Stanley Wires, chief engineer of the Sandusky & Lake Erie Islands line freight and passenger steamer CHIPPEWA, fell into a hold aboard the steamer and was seriously injured Dec. 3. Mr. Wires was 56 and lived on North Bass Island.

Marine Surveyor Dies

John A. Weisbeck, one of the best known marine surveyors in the Great Lakes region, and district representative for Lloyd's, died at his home in Buffalo Dec. 5 at the age of 68.

Connected to marine circles for 38 years, Mr. Weisbeck had gained the respect of vesselmen from every port. Born and educated in Buffalo, he began his surveying career about 38 years ago, being in business for himself. About 12 years ago he became Lloyd's representative in his district, continuing in this work until the time of his illness.

Two Electric Carferries for Lake Michigan

The Pere Marquette railway has let the contract to the Manitowoc Ship Building Corp., Manitowoc, Wis., for two carferries to cost approximately $1,250,000 each. According to John A. Hewitt, general agent at Milwaukee, the contract specifies a speed of 18 miles an hour, and to accomplish this, the new boats will be powered with turbine-electric drive. This is the first application of electric drive to this type of craft. Delivery will be made in 10 months and 12 months from the day the keels are laid. The new ferries will increase the Pere Marquette fleet, operating between Ludington, Mich., and Manitowoc and Milwaukee, to nine vessels. The length of voyage varies from 60 to 100 miles. They will be know as the Pere Marquette 23 and Pere Marqueete 24. The contract was let on Dec. 6

Electric equipment for propulsion and the operation of auxiliaries will be supplied by the General Electric Co. Each boat will have a draft of approximately 16 feet and will be designed to carry twenty-eight 42-foot railroad cars. The cars carried will consist mainly of the freight type. The design of the boat will be standard for this type of service, but will also include features allowing operation during the winter months when ice breaking is necessary. The power plant and other machinery will be located amidships.

Each boat will have twin screws. Two turbine generators on each boat will each be capable of furnishing propulsion and auxiliary power sufficient to operate all the electric equipment on the ship, including propusion motors, auxiliary devices and lighting. Each propeller will be driven by a 3600-horsepower, 120 revolutions per minute, 2300-volt, slip-ring induction motor. These motors will be of the type of construction used in mill service on land, in order to withstand the severe duty encountered in ice breaking service.

The generators will distribute power at 2300 volts direct to the motors. These turbines will operate at a pressure of 300 pounds gage, 200 degrees Fahr. superheat and 28½ inches vacuum. Steam will be furnished by Babcock-Wilcox watertube boilers.

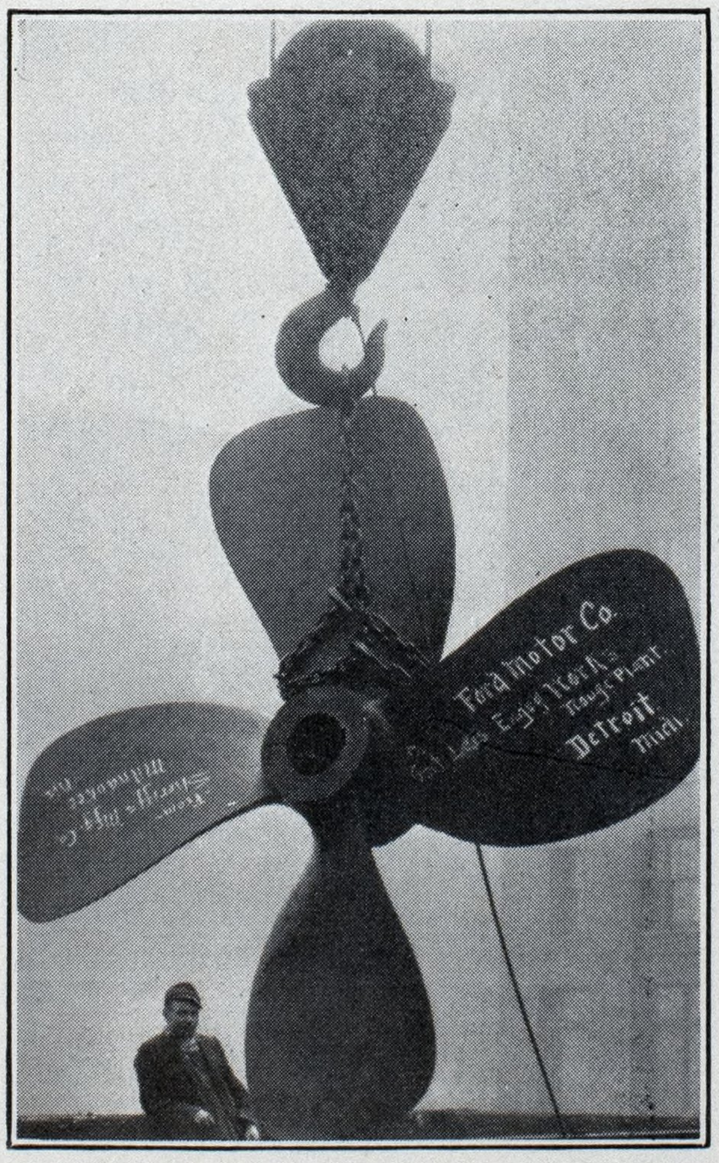
The electrification of auxiliaries includes an aggregate of approximately 600 horsepower in electric motors on each boat, driving such machines as main circulating pumps, main boiler feed pumps, fresh water circulating pumps, sanitary pumps, bilge pumps, capstans, windlasses and winches. For use during long periods at port, there will be a 150-kilowatt auxiliary turbine generator to supply power for operating lights and those auxiliaries which it will be necessary to keep in service on such occasions. The propulsion machinery will be controlled by a combination of varying turbine speeds and varying resistance in the secondary circuits of the propulsion motors.

Index for 1928

The index for the year 1928, *covering all of the valuable editorial material which appeared in* MARINE REVIEW *last year, is now ready for distribution. Copies will be sent on request, without charge, to those subscribers who have kept a complete file of copies and desire the index for reference.*

Lake Ormoc's Propeller

When the LAKE ORMOC was converted to diesel drive for use as a base ship for the Ford rubber plantations on the upper Amazon river in South America it was found that a new propeller designed to suit the power and revolutions of the new engine would be necessary. The accompanying illustration shows the new propeller. It is of cast iron, and is 10 feet in diameter and weighs 5000 pounds. This propeller was made by the Sheriffs Mfg. Co., Milwaukee, one of the oldest concerns in the country specializing in the design and manufacture of propellers.



SHERIFFS PROPELLER FOR LAKE ORMOC

Cement Self Unloader for Great Lakes Service

A novel application of self unloading to a cement carrier is to be made by the Petoskey Transportation Co. Petoskey, Mich., to serve the Petoskey Portland Cement Co. of that place, and to operate on the Great Lakes. The J. B. JOHNS, a reciprocating engine-driven craft, is being reconditioned for this service. The unloading equipment will be arranged for electric operation, although the old steam drive will be retained.

Power for the electric equipment will be supplied by two 400-kilowatt, 480-volt, 3-phase, 60-cycle turbine generators. These and the other electric devices for the ship are now being built by the General Electric Co. All auxiliaries will operate directly from the turbine generators without the use of any transformers or motor-generator sets, except for lighting purposes.

The principal auxiliary equipment will be two Fuller-Kenyon cement pumps each driven by a mill-type, 175-horsepower, 900 revolutions induction motor with magnetic control. There will also be two screw conveyors each driven by a 100-horsepower, 900 revolutions induction motor with drum controllers, and two cross conveyors driven by 20-horsepower motors. Power for lighting will be supplied by a 12-kilowatt motor-generator set.

Foreign Ships on Lakes

During the closing weeks of November and the early part of December, some 30 Norwegian steamers passed through Montreal enroute from the Great Lakes to Norway with cargoes of American or Canadian grain. During the season of navigation, these vessels have been engaged in transporting grain from American ports to Montreal on the inland waterways of Canada. According to reports, Canadian lake operators have found much to criticize in the fact that vessels not carrying the flags of Great Britain, the United States or Canada, should be permitted to operate without payment of fees required of American, British and Canadian ships.

Two Bulk Freighters

Great Lakes shipyards are figuring on two standard 600-foot bulk cargo carriers for the Pittsburgh Steamship Co. It is understood that the vessels in general will be similar to the A. F. HARVEY and B. F. AFFLECK completed in 1927 by the Great Lakes Engineering Works and the Toledo Shipbuilding Co. Inc., respectively.

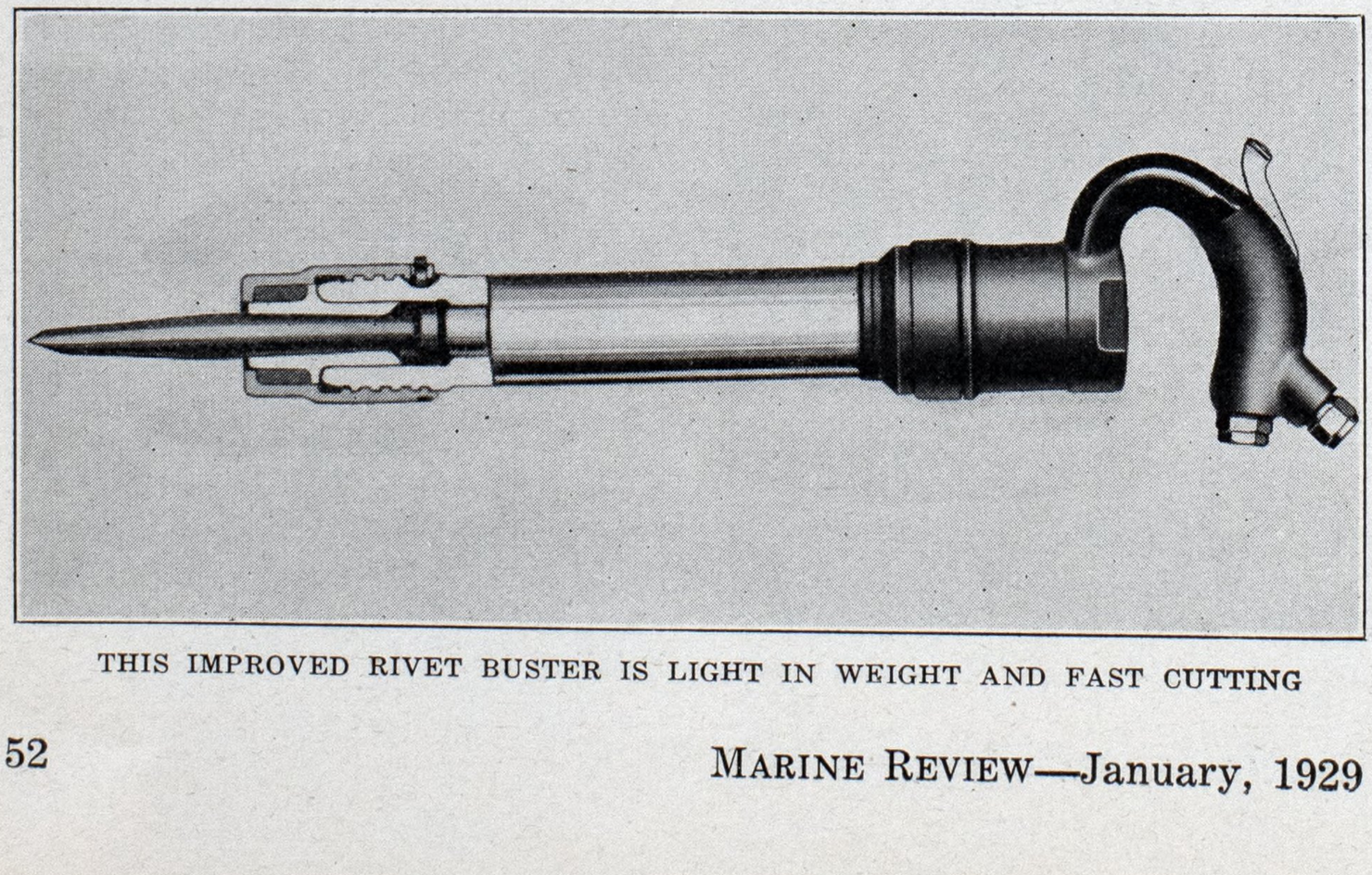
Equipment Used Afloat, Ashore

Valve Operating Machine—Electrode Holder—Fire-Fighting Unit Expansion Joint — Pressure Lubricator — Close-quarter Drill

A RIVET buster for cutting off rivet heads up to ¾-inch and for knocking the rivets out has been developed by the Ingersoll-Rand Co., 11 Broadway, New York. This pneumatic hammer is sufficiently light to be readily handled by one man, is easy to hold and fast cutting. In addition, the cutting tools are securely held in the hammer and the design is such that light weight tools are used, so that very little of the power of the hammer is absorbed by them.

The nozzle end is finished with a heavy square-section thread, over which a retainer nut screws. This nut takes the blow of the hammer through a rubber buffer if the hammer is operated without the cutting tool held against the work. The success of the retainer device is due to a heavy, strong knob on the upper end of the taper shank tools used. This knob permits the use of light weight tools; it does not weaken the shank as notches or grooves cut in it would. It provides a shoulder for transmitting the blow through a split nozzle to the rubber buffer and on to the retainer nut, when the hammer is operated without the chisel held against the work, and it gives absolute safety. The chisel cannot be shot out of the tool.

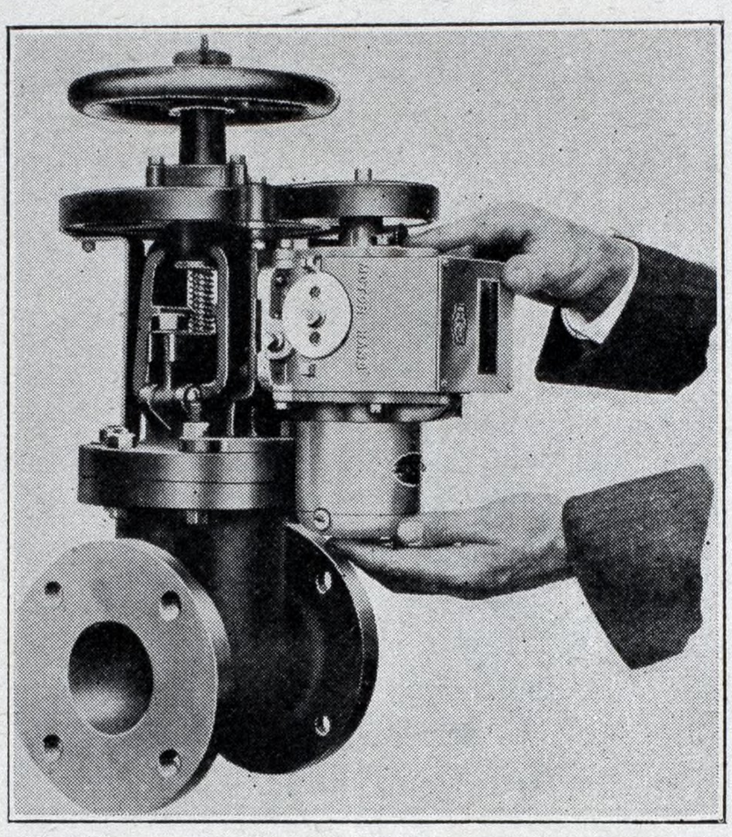
Three different tools are furnished for use in this rivet buster: a cutting chisel, a shearing chisel, and a knockout punch. The cutting chisel has a cutting action rather than a shearing action and is recommended for general rivet busting and especially for loose rivets. The shearing chisel is for use on tight rivets. The steel used in the chisels and punch is a special alloy steel.



THIS IMPROVED RIVET BUSTER IS LIGHT IN WEIGHT AND FAST CUTTING

Motor Driven Mechanism for Operating Valves

A new motor-driven valve operating unit, which makes possible automatic operation of all valves up to six inches, has been announced by the Cutler-Hammer Mfg. Co., Milwaukee.



MOTOR DRIVEN VALVE OPERATING UNIT

Although so small that it can be held in one hand, this unique operating unit has a rating of 15 pounds per foot. It can be operated automatically by means of float switches, temperature controlling devices, pressure regulators, etc., or by conveniently located push buttons.

Although only recently placed on the market this valve operating unit is similar in principle to the company's standard operating unit which has a successful record of 12 years.

While designed primarily for valve operating service in industries where regulation of pressures and temperatures of gases and fluids is necessary, it is likewise adaptable to many miscellaneous applications, such as operating skylights, awnings, radiators, garage doors, etc.

Its application in the marine field is manifold, as many valves on board ship are large or need automatic control.

New Electrode Holder Facilitates Welding

A new electrode holder for metallic arc welding which has several unique points of advantage has recently been brought out by the Fusion Welding Corp., Chicago. It is claimed by the makers that the principal cause of electrode overheating is improper contact in the electrode holder.

The act of inserting the electrode in this new holder automatically scrapes off any insulating material that may be present on the welding rod insuring four clean points of firm contact and thereby minimizing the overheating of the electrode.

In addition, attention is called to the simple construction of this holder which has no strings or moving parts. The jaws are made of the same special copper alloy that is used to support and attach trolley wires to the cross wires. This alloy resists arcing, and as this arcing in the holder jaws is the principal cause of damage to most holders it is felt that the holder will last longer.

Spattered drops of electrode metal will not stick to this copper alloy and the holder stays clean. It is very easy to load. When the electrode has been inserted between the jaws it may be placed at any desired angle to facilitate work in difficult welding positions. The act of inserting a fresh electrode automatically ejects the stub end of the old electrode without the welder touching it.

The holder is very light in weight considering its unusually substantial construction and is nicely balanced so as not to fatigue the welding operator.

New Fire-Fighting Unit for Ship Safety

A new form of fire-fighting equipment has been placed on the market by the makers of Firefoam, a fire extinguishing agent, manufactured by the American-LaFrance & Foamite Corp., successors to the Foamite-Childs Corp., the originators of the product.

While the original product was designed for the oil industry and gradually gained a definite marine application, the Foamite-Generator system affords complete fire protection in engine and boiler rooms through fixed piping and to practically all other parts of the ship with the aid of a hose.

The generator of this new type extinguisher weighs 72 pounds, occupies three feet of floor space, requires 55 gallons of water per minute and generates 500 gallons of the extinguishing gas per minute. It produces a sustained stream of the fire-killing element which is carbon dioxide gas. The upper half of the generator is composed of a hopper into which the powder is poured at the time of the fire, while the lower portion is the generator body, through which water is pumped at a given pressure. If the water pressure is low the flow of the powder will be slow, if the pressure is high, the flow of the powder will be rapid. The generator is portable and can be moved to any position on the ship.

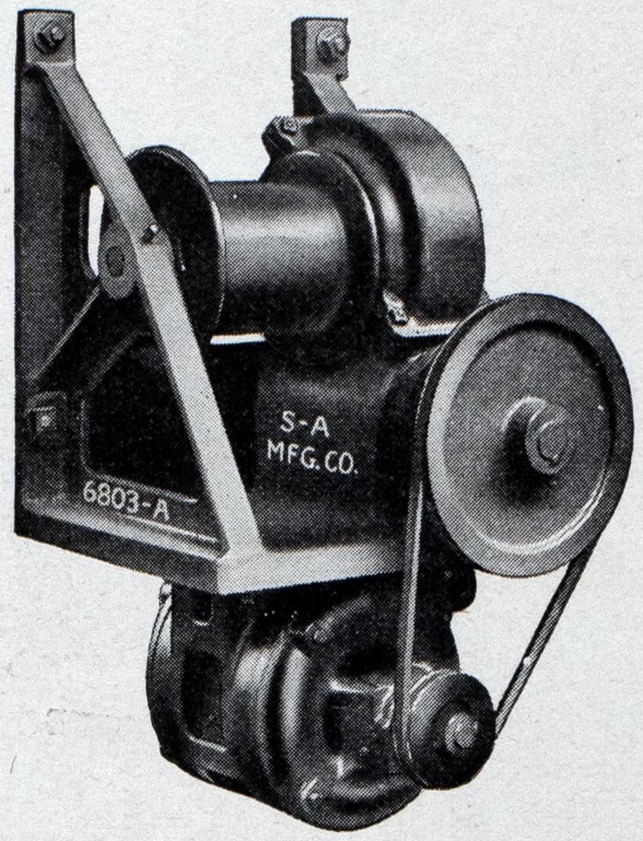
Suction, caused by the water passing through the lower section draws the powder into the water stream. A shut-off valve controlling the water supply to the generator is furnished.

The manufacturers claim that this new system makes accessible those places which are ordinarily out of reach of the hose stream. The space beneath the fireroom floor makes fighting fire there almost of no avail through the use of the hose stream. Through application of this new extinguishing system, the fire-arresting gas is discharged through vents or heads, falls at the rate of one inch per minute and smothers the fire.

Motor Driven Winches Are Reversible

The accompanying illustration shows one of two types of motor driven winches developed recently by Stephens-Adamson Mfg. Co., Aurora, Ill., and suitable for use in marine work. Both styles, according to the manufacturers are being used in numerous places for lifting castings and light machinery. They are being used also for raising furnace doors, ventilators, walkways, counterweights, light elevators and bridges.

For several years, this concern has manufactured an assortment of hand power winches for lifting loads of 500 to 1500 pounds. These light winches have a worm gear reduction which prevents accidental dropping of the load and have been so successful that two styles were designed with electric drive, to replace hand operation



NEW MOTOR DRIVEN WINCHES

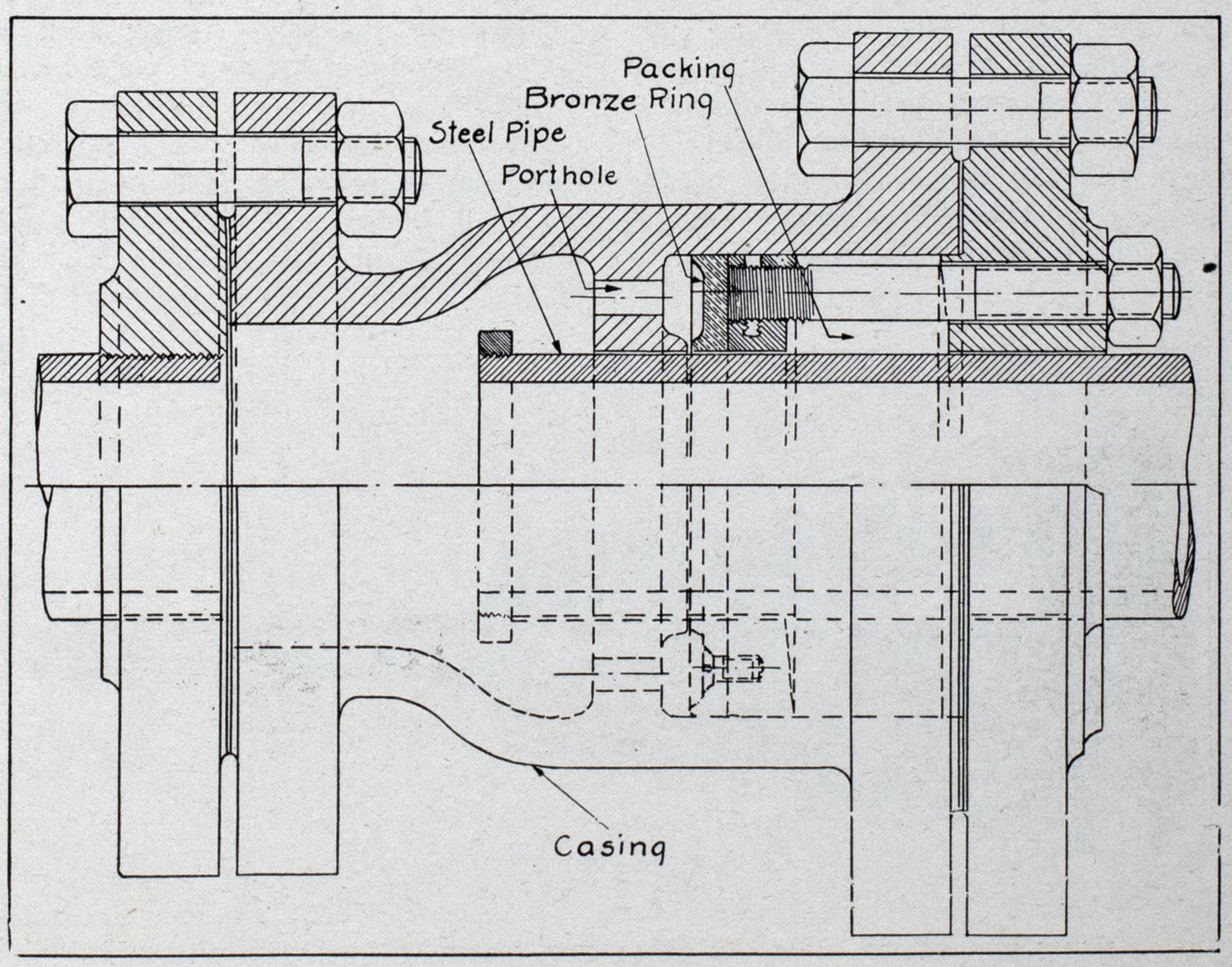
The style illustrated herewith is for wall mounting. Another model not illustrated is designed for floor or pedestal. Both types are furnished with 1, 1½ or 2-horsepower reversible electric motors and the maker claims that they are conservatively rated to pull 700-1100 and 1400 pounds respectively at a rope speed of 25 feet per minute.

The manufacturer recommends the use of ¼ to ⅜-inch cable and states that the drum will hold 100 feet of ¼-inch and 60 feet of ⅜-inch cable. All gears are cut and operate in oil. The worm in each style is fitted with ball thrust bearings which permit free operation in either diection.

Designs Expansion Joint for Pressure Lines

Rigid and simple construction is claimed for a new type of expansion joint which has a marine application. This new unit has been designed by Tobias Miller, Cleveland.

The joint is for use on various types of pressure lines where the expansion is considerable. As shown in the accompanying diagram, the unit consists of a cast iron casing to one end of which is bolted a flange. One end of the line pipe is threaded into this flange; the other end slides in the joint. The bronze or brass ring indicated expands under pressure and fits against the casing and pipe. This ring is bolted to a steel or cast iron ring for holding the bolts which keep the packing tight. A cap is securely fastened over the packing end of the casing. The portholes are for the purpose of allowing the pressure to apply against the rings. Another ring is attached to the end of the movable pipe to prevent its slipping out of the casing. Because of the self-adjustment features of the expansion joint, it is said to eliminate wear and



CONSTRUCTION DETAILS OF EXPANSION JOINT

tear on the anchorage of the pipe system. Due to the double guide construction and the ring which is attached to the inner end of the slip pipe, the device may act as a swivel joint. Leakage is claimed to be negligible because of the entirely enclosed casing and the snug fit which the inner pressure produces.

Bearing Lubrication by Pressure Device

Complete and efficient bearing lubrication is very necessary for the proper maintenance and correct operation of ship auxiliaries and power plants, as well as machinery of shipyards and repair shops. Pressure lubricating devices for use in marine work have been developed and marketed by the Dot Lubrication division of the Carr Fastener Co., Cambridge, Mass.

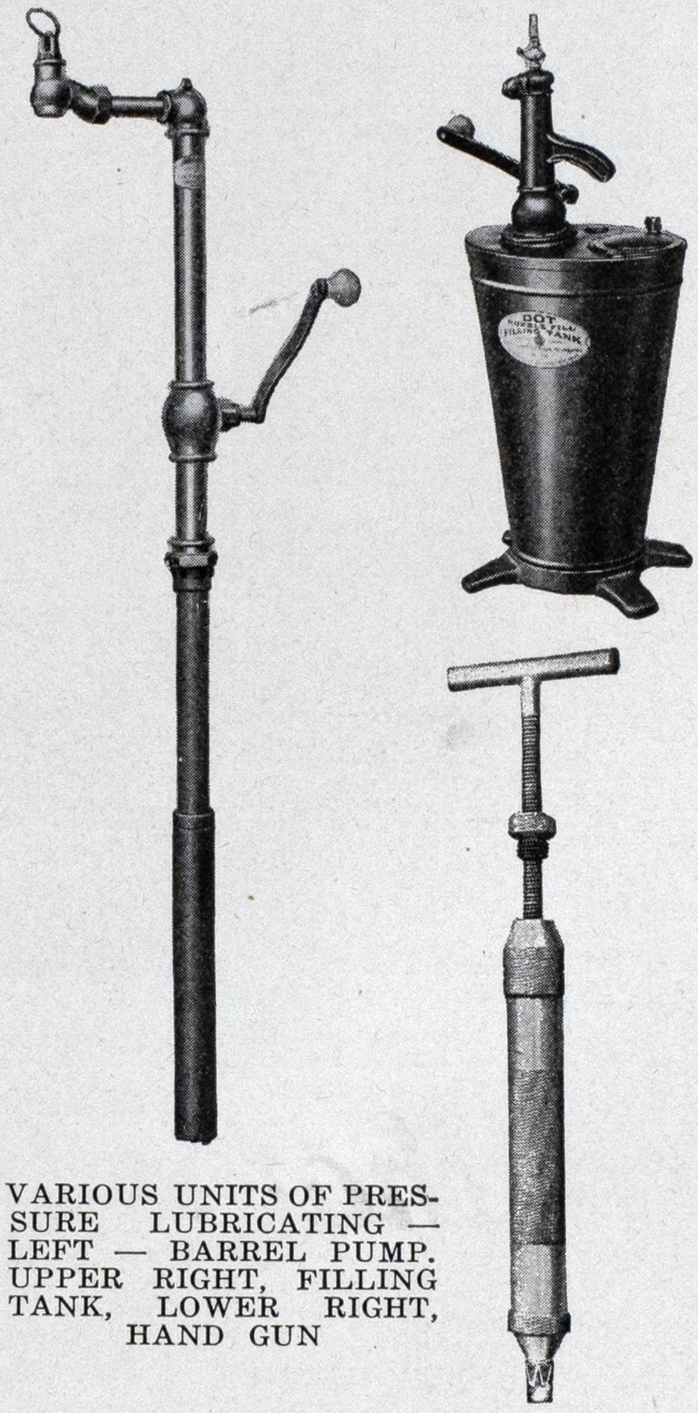
These devices are said by the manufacturer to supply clean lubricant and deliver it to bearings at the correct constant rate.

The lubricant is put into the hand-filling tank shown in an accompanying illustration by use of the barrel pump also illustrated. According to the makers, the grease is kept free from foreign elements because of the fact that the various units protect the lubricant from contact with the air except for an instant.

The filling tank, said to be practically air-tight and dust proof, is fitted with a nipple which is engaged with a nozzle on the pump when it is desired to fill the grease gun. The operator, by turning a crank on the portable tank fills the gun. By engaging the gun with pressure cups on the bearings and twisting the handle until the bearing flushes or until the tell tale at the top of the bearing reaches its extreme height, the job of lubricating is complete.

New Close Quarter Drill Is Air-Motor Driven

A new gear driven close quarter drill with a two-cylinder double acting air motor has been developed by the Ingersoll-Rand Co., New York city. It has been brought out for general drilling, reaming and tapping in close quarters. It develops approximately 20 per cent more horsepower



VARIOUS UNITS OF PRESSURE LUBRICATING — LEFT — BARREL PUMP. UPPER RIGHT, FILLING TANK, LOWER RIGHT, HAND GUN

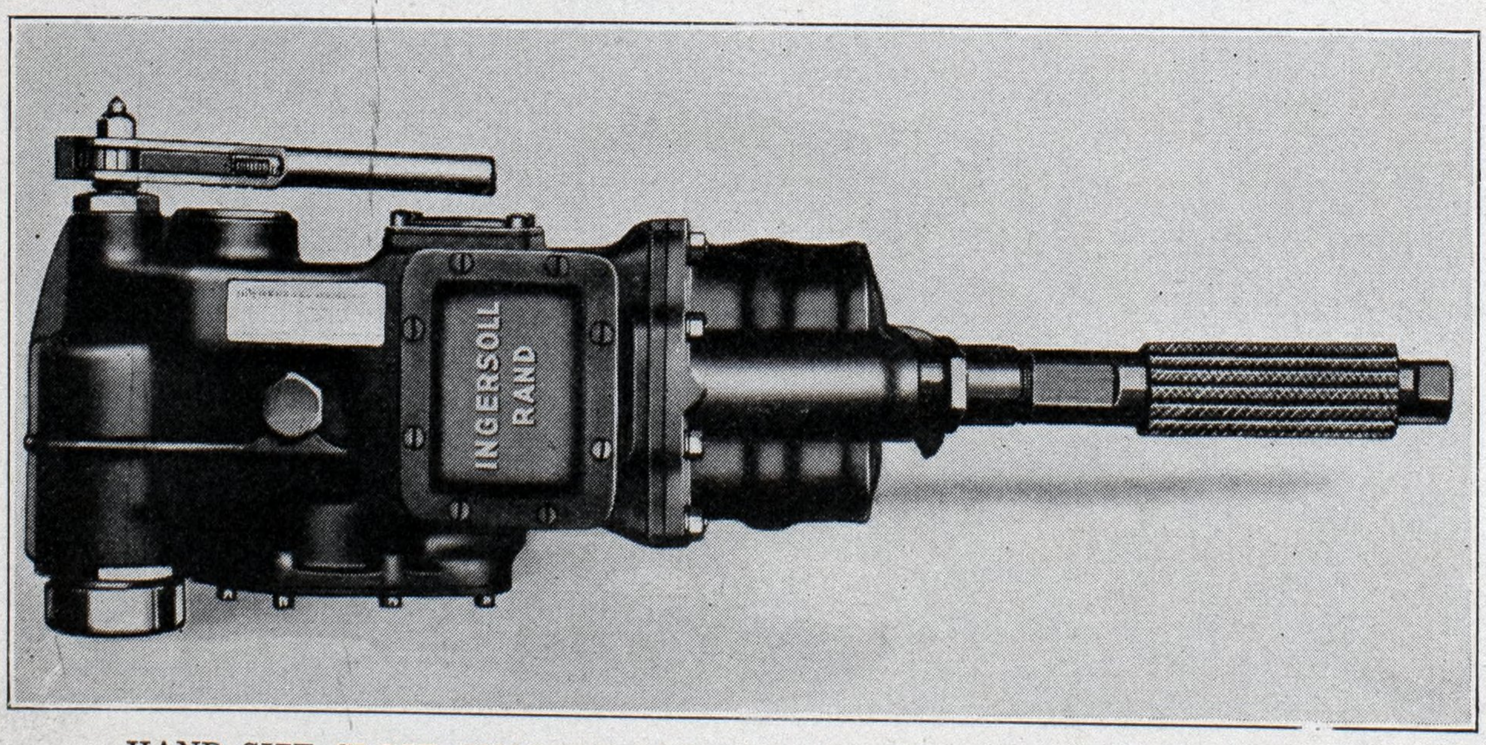
and has 10 per cent higher stalling power than older types of close quarter drills.

Minimum thickness of the machine has been secured by making it flat, the drill being practically the same thickness from the spindle to the cylinders. It can therefore be readily used in very cramped places.

Very smooth operation has been secured by arranging the pistons to act at right angles to and in a plane with the spindle; by using a counterbalanced crank and by using special gears for the drive.

The gears are built strong and rugged, their size and strength being increased as the load carried increases, until the final drive on the spindle is through a heavy herringbone gear which gives a smooth and steady driving action. Antifriction bearings of the ball or roller type are used throughout.

Three different spindles can be furnished, the standard spindle having a Morse taper socket. A threaded spindle 1-11/16-inch diameter, 12 threads per inch, to take square socket chucks or the Rich chuck, can also be furnished. The third spindle obtainable is one which has a special taper.



HAND SIZE CLOSE QUARTER DRILL FOR GENERAL DRILLING, REAMING AND TAPPING

Insulator Material for Ship Refrigeration

Extensive scientific research and experimental work with dried peat moss in Germany has resulted in the transformation of this substance into a protective insulating material known as Torfoleum, marketed in this country by Pennrick & Co. Inc., New York City. Dried peat moss, long recognized as an ideal insulator, is the basic material used in the manufacture of this product.

According to the distributors, this insulating material has been used in Europe for many years with highly satisfactory results as to efficiency and economy. It is made in sheet form, 19½ inches wide by 39 inches long and from 1 to 6 inches thick. It is said to possess the low thermal conductivity of 0.27 British thermal unit per square foot per hour, per degree temperature difference, per 1 inch of thickness. It is said to be noncapillary and the compression in 1 inch under a load of 1764 pounds is only 0.03 inch. This material is at the present time manufactured in Europe but ample stock is carried in this country.

It smost extensive use in the maritime field is for refrigerator boxes in ships. Among its other uses are those for general insulation and sound-quieting. It is reported by the distributors that the German national railways, the national railways of Holland, leading steamship lines and important European industries are large users of the product. Efficient insulation of sound and heat is an important shipboard need.

Electric Liner Virginia

(*Continued from Page 22*)

dling equipment consists of 24 Lidgerwood electric winches. Part of these have a capacity of 3000 pounds at a rope speed of 175 feet per minute, and part have a capacity of 3000 pounds at 235 feet per minute. Additional equipment on deck consists of two separate electric winches, and boat handling hoists.

Two Otis passenger elevators and one Otis engineers' elevator facilitate travel from one level to another on this eight deck boat. There are also two McLaughlin automatic dumbwaiters of 100 pounds capacity each. Mechanical ventilation of passenger and crew spaces is particularly extensive on the VIRGINIA because of the semitropical nature of part of its scheduled trips. This ventilation is provided by 27 motor-driven multivane fans of capacities ranging from 2500 to 30,000 cubic feet a minute.

Extensive Interior Communications

The interior communications following the scheme of the CALIFORNIA are extensive. The engineer is signaled by means of a Cory mechanical telegraph system. The whistle can be set for automatic operation or at-will operation as desired. Loud speaking telephone stations are located throughout the engine room and 16 interior communicating stations are provided in other parts of the vessel.

The safety features follow the elaborate example set by the sister ship and include Welin quadrant davits and steel life boats. For navigation there is a Sperry gyro compass and automatic steerer.

The master of the VIRGINIA is Capt. H. A. T. Candy who also served as master for the initial trip of the CALIFORNIA. He is a resident of New York and has been following the sea for 42 years. After service as a young man in the Red Star line, he went aboard the S. S. NEW YORK, as third officer in 1900. In 1903, he was appointed second officer of the S. S. PHILADELPHIA. In 1915 he secured his master's license and took as his first command the FINLAND of the Panama Pacific line. In 1916 he became commander of the PHILADELPHIA. After the war, when the sailings of the Panama Pacific intercoastal service were resumed, Captain Candy was again put in command of the FINLAND and later he was placed in command of the MONGOLIA, which position he held at the time he was appointed to command the CALIFORNIA in 1927.

One cannot help but draw contrasts between the modern oil burning electric liner and the older types of coal burning vessels with which persons were so familiar just a few years back. The contrast brings out very decidedly the new era entered and to the men in the engine room who used to struggle through the tropics on the end of a short handled shovel, it is surely the age of their deliberation from the slavery of toil too hard for any human to stand.

New Era in Ship Construction

The passengers, who travel on these modern electric liners are going to be delighted with the mysterious, quiet and vibrationless movement of the ship through tropical seas, the sightseeing tours at Havana, Cuba, and Panama while enroute; they are also going to enjoy to the fullest extent the outdoor swimming pools, the morning and afternoon concerts, deck sports, gymnasium, dancing in the evening, and the verandah cafe. In a deeper sense, however, they are going to enjoy these things all the more because they know that the men who work on these vessels are sharing in the benefits which electricity has provided.

The CALIFORNIA and VIRGINIA, sister ships, now pave the way for a new era in ship construction that is in keeping with that modern and up-to-date American spirit—let machinery do the work.

Both vessels are a great credit to the Newport News Shipbuilding & Dry Dock Co., who built the vessels; to the General Electric Co., who powered the vessels; to the Babcock-Wilcox Co., who built the boilers, and to the International Mercantile Marine Co. whose far, sighted policy is so in keeping with our national ideals.

Diesel Society Formed

With over 200 members the Diesel Society of America, organized under the laws of the state of New York, has begun its activities. The office of the society is located at 26 Court street, Brooklyn, N. Y. It is the first organization of its kind exclusively composed of professional and practical engineers in the field of diesel engineering. The aim of the society is to promote interest in the adaptation, improvement and use of diesel and other oil engines for all purposes; to formulate rules and regulations affecting the diesel engine; and to obtain information and data for the use of its members. The officers elected for the ensuing term are: president, Julius Rosbloom; vice president, Richard A. Meyer and secretary, Walter Knudsen.

Electric Drive Economy

(*Continued from Page 25*)

allowed to flow through the field windings, a revolving magnetic field is set up, which causes current to flow in the armature circuit. Three main current-carrying leads conduct the electricity to the motor. The field lever, situated on the operating panel, connects the field windings of the generator with a direct-current source.

When an alternating-current motor of the three-phase type is connected to its source of power, its direction of rotation depends upon the way the leads are connected. If the relative position of two of the three leads is altered the motor will reverse its direction of rotation. The changing of these leads on an electrically driven ship is accomplished by means of the reversing lever.

In maneuvering an electrically driven vessel, if it is desired to reverse, it is only necessary to slow down the turbine, push the field lever to its "off" position, push the operating lever to its "reverse" position and again apply the field current to the generator by means of the field lever. These two levers are always interlocked in a manner that makes it necessary to take the field current off the generator before switching the main current-carrying leads. The foregoing operations are accomplished very rapidly even on the highest powered equipments. Maximum power of course is available for backing as well as for going ahead.

The instruments on the operating panel consist essentially of a main line voltmeter, a main line ammeter and a wattmeter for measuring the power input into the motors; an ammeter for the generator field circuit, and temperature recording instruments for both the generator and motor windings. In addition there are steam gages, vacuum gages, revolution counters, etc., the same as on any steam vessel.

Can Run on One Generator

On the California and Virginia provision is made for operating both the starboard and port propelling motors from either main generator at reduced power if desired. It is possible on either of these vessels to attain approximately 75 per cent maximum ship's speed with half the main generating plant shut down. This of course is very economical as it also permits the closing down of one condensing plant with its auxiliaries.

The auxiliary power plant on these vessels consists of four turbine-driven direct-current generators each rated 500 kilowatts. In operation at sea,

even under full power conditions, it is usually necessary to operate only two of these. When a third is pressed into service it is only because of some unusually heavy load of short duration, such as might exist when the refrigerating plant is thrown on the line during the first precooling period. The fourth direct-current generator is always available as a spare.

There are two direct-current busses: the excitation bus and the power bus. A number of the engine room auxiliaries are arranged with double-throw switches so that the load on each of the generators may be evened up.

The feed water heating system on the CALIFORNIA and VIRGINIA is of the multiple-stage, series type. As practically all of the auxiliaries are electrified, with the exception of the feed pump and a few pumps of minor capacity, the system worked out quite well on a two-pressure basis. Steam is extracted from the main turbines at about atmospheric pressure and the temperature of the feed water is boosted to approximately 190 degrees Fahr. The exhaust steam from the steam auxiliaries is maintained at about 10 pounds gage pressure and is utilized in the high pressure heater where the temperature is boosted to about 230 degrees Fahr. Should the quantity of auxiliary exhaust vary, adjustment for maximum temperature is made by varying the amount extracted from the turbines for the low-pressure heater. The system has proved very flexible and easy to control.

The third vessel which is now being built in the yards of the Newport News Shipbuilding & Drydock Co., Newport News, Va., will be ready for launching it is expected in the fall of 1929. These three vessels represent an outlay of more than $21,000,000. The last vessel, a duplicate of the VIRGINIA, will complete one of the finest ship programs ever undertaken by any ship operating company in the history of American shipping.

American Foreign Trade

Freight Bill, $730,000,000—Over 66 Per Cent Goes to Foreign Flag Ships

THE bureau of research of the United States chamber of commerce has supplied some very interesting and significant information about American foreign commerce:

Of 5760 ships of 26,000,000 gross tons employed in the transportation of our foreign commerce, less than one-third of the ships so employed are American flag vessels. More than thirty nations participate in our foreign trade, and that British flag vessels outnumber the American flag ships. The British vessels carry more cargo tonnage in the foreign trade of the United States than is carried by American ships.

Foreign flag vessels to the number of 4085 and of 19,000,000 gross tons, carry more than 66 per cent of our entire foreign trade. More than 20 per cent of these vessels were built since 1921. American flag vessels to the number of 1675 and of 7,000,000 gross tons, carry less than 34 per cent of our entire foreign trade. Less than 4 per cent of these vessels were built since 1921.

Vessels entrances and clearances in our foreign trade exceed 58,000 per annum. More than 30 per cent of the vessels coming into United States ports arrive in ballast and more than 25 per cent of those leaving our ports depart in ballast. Our water-borne foreign commerce involves the transportation annually of more than 113,000,000 long tons of freight, valued at nearly $8,000,000,000. The freight bill for carrying this commerce is approximately $730,000,000.

The overseas trade of the United States includes commerce with all foreign nations other than Canada and the countries bordering the Gulf of Mexico and the Caribbean sea, that is, Mexico, Central America, the West Indies and the North coast of South America to and including the Guianas. In the overseas trade, which constitutes nearly 62 per cent in tonnage volume and 80 per cent in value of our entire water-borne foreign commerce, American flag vessels carry less than 30 per cent of the import cargo tonnage, and less than 19 per cent of the export cargo tonnage. The average value of overseas imports is $182.55 per ton and the average value of overseas exports is $66.20 per ton.

The nearby ocean trade of the United States includes commerce with Canada, Mexico, Central America, West Indies and North coast of South America to and including the Guianas. In the nearby ocean trade, which constitutes more than 26 per cent in tonnage value of our entire water-borne foreign commerce, American vessels carry approximately 56 per cent of the import cargo tonnage and 52 per cent of the export cargo tonnage.

The Great Lakes cargo trade with Canada includes tonnage amounting to more than 11 per cent of our total water-borne foreign commerce, and American vessels carry two-thirds of the import cargo, but only 40 per cent of the export cargo in the Great Lakes foreign trade. The average value of nearby imports, including Great Lakes trade, is $26.12 per ton and the average value of exports is $37.44 per ton.

Shipping Board Report Points To Ship Sales

Substantial progress in the government's policy of transferring tonnage to private American control is shown in the shipping board's twelfth annual report to congress. During the fiscal year, for which the report is made, four complete lines aggregating 45 vessels having 401,802 deadweight tons and an additional two vessels having 18,260 deadweight tons were sold for guaranteed operation. In addition to these, 20 ships with a total deadweight tonnage of 133,942 were sold to private American owners. This record brought the total sales to June 30, 1928 up to 1557 with an aggregate deadweight tonnage of 7,587,238. Fifteen established lines are included in this total.

With the sales completed as of the date of the report a total of only 758 vessels remain in the government's possession. The past fiscal year saw the sale of all the government's remaining lines on the Pacific ocean. The 21 established lines which were still being operated by the shipping board on June 30, together with 505 ships in the laid-up fleet, are offered for sale to American citizens at low prices and on attractive terms. While the year has been a notable one in the matter of sales, the report indicates that the recently enacted Jones-White measure, providing more liberal ocean mail rates and ship construction loans, is still further stimulating the desire of American citizens to take over the board's remaining ships.

The Electric Storage Battery Co. recently announced the appointment of Albert N. Dingee as advertising manager to succeed the late Alfred B. Kreitzburg.

Good Stevedoring

(*Continued from Page* 45)

of transportation cost, and the stevedore must see that every man of the various gangs under his control works to maximum capacity. Hence it is that the stevedore is a stickler for what he terms the proper distribution of cargo.

Certain commodities, naturally, are handled more easily than others, and a gang handling comparatively "easy cargo"—all things being equal—will finish a job before a gang handling extremely difficult cargo. Well-managed stevedoring so apportions work and distributes cargo that no time is lost either in waiting for "gear equipment" or in shifting men about. Simultaneous and continuous action of all his gang is the goal aimed at by the conscientious stevedore.

One of the leading questions of the stevedore is "When are they going to send me that cargo for the steamer's last port of call?" He needs "that certain cargo" generally for the hold of his vessel, as cargo is loaded in reverse order to the steamer's cargo list of ports of call. Thus, if Panama is the first port of call on the vessel's itinerary, and Talcahuano, Chile, is the last, the cargo for Talcahuano should be forwarded first for shipment. Of course, there are exceptions to this matter of precedence of cargo, as bulk is largely the determining factor and the complicating phase of stowing, but the general rule holds good. It is said that a stevedore acquires his large and decorative vocabulary—not unmixed with cogent profanity—from the anxious moments passed in waiting for the necessary cargo destined for final ports of call to arrive at the pier. He is never happly till he gets it.

The fundamental principle of sound stevedoring is to maintain the vessel's stability—the cargo must not become topheavy, or the ship turns turtle and another catastrophe of the sea is registered with Lloyd's—she has gone down to Davy Jones' locker, where so many other vessels have checked in their log.

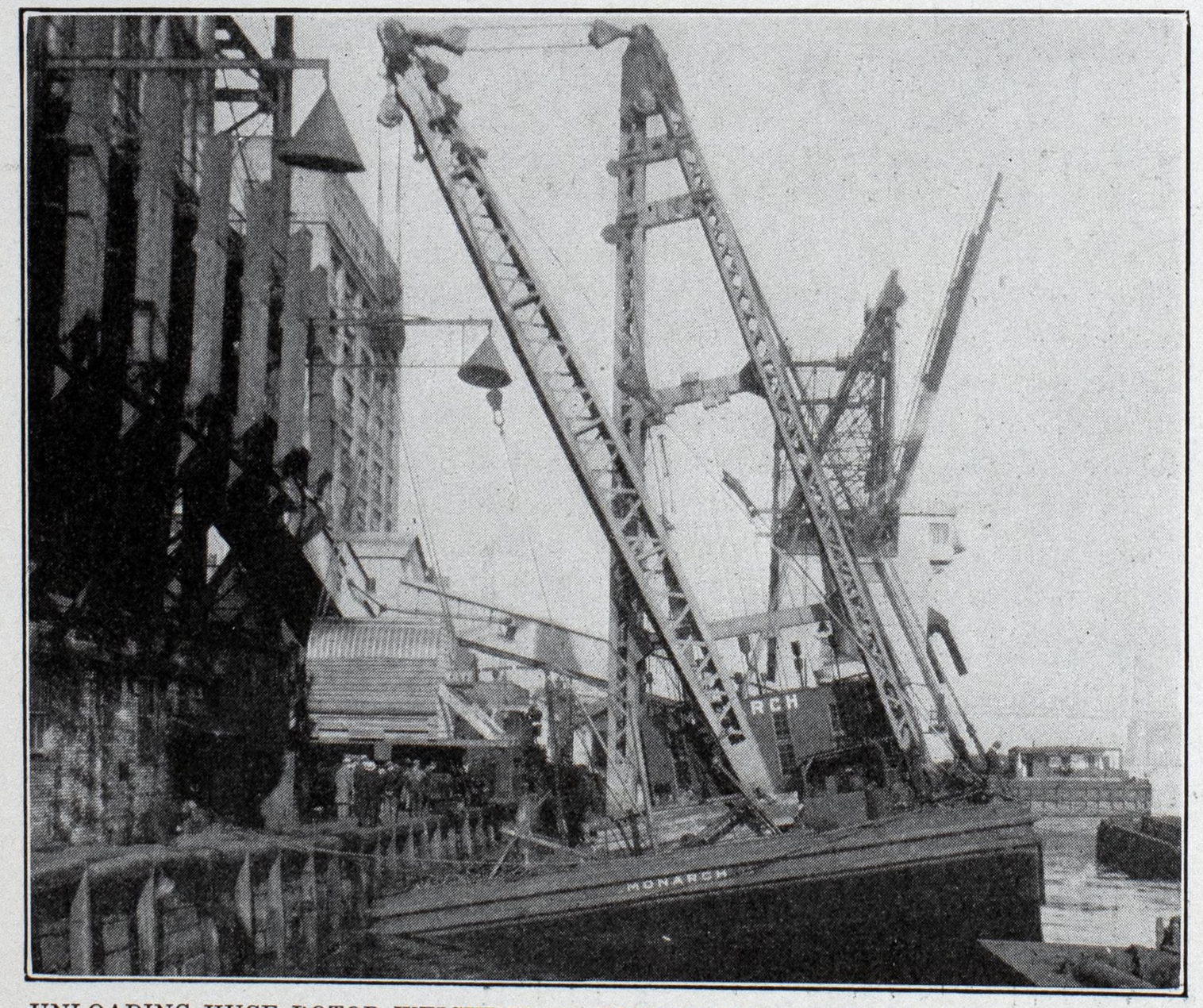
During the entire loading process—an operation technically known as "chocking off" is carried on. This is to say that all empty spaces between cases or other specific commodities are wedged in by means of blocks of wood, iron, or other miscellaneous cargo of sufficient size to fill in the vacancy. This "chocking off" process prevents slipping of cargo at sea, which naturally would cause untold damage to any shipment of merchandise. The "chocker off" is an artist in his line, and his calculations are made to a nicety.

Derrick Barge Moves Heavy Shipment

THE essential usefulness of our inland waterways, with their freedom from clearance and other limitations, was made apparent recently when the New York Edison Co. received at its Waterside Generating station in New York, via the Merritt-Chapman & Scott Corp.'s floating derrick, MONARCH, two huge rotors for the frequency changers, of 40,000 kilowatts capacity each. The installation of these rotors will permit the interchange of power between the 60-cycle system of the Brooklyn Edison Co. and the 25-cycle system of the United Edison Co. in lower Manhattan.

These two great pieces of apparatus which, according to the General Electric Co., constitute a record shipment of such equipment, weighed 113 tons each, measured 13 feet across and, even on the special "well" cars which carried them, rose eighteen and a half feet above the roadbed. The maximum width clearance on the Delaware & Hudson railroad is but 10½ feet, so it obviously was impossible to move the shipment on a single track. The unique expedient therefore was hit upon of completely tying up the three tracks of the railroad during the time required to move them from Schenectady to South Albany. This was done early on Sunday morning, Nov. 4, clearing all tracks of standing cars or moving trains.

This article was submitted by Robert D. MacMillan, 220 Broadway, New York City.



UNLOADING HUGE ROTOR WEIGHING 113 TONS FROM DERRICK BARGE MONARCH AT THE NEW YORK EDISON CO. STATION ON THE EAST RIVER, NEW YORK

At South Albany, the pieces were swung off the cars and upon its own deck by the derrick MONARCH. Thirty-six hours later the shipment arrived at the docks of the Waterside station in New York and there was unloaded, without mishap, delay, or incident of any kind. This derrick, which is the largest in the world, is capable of lifting 300 tons overside and is utilized for similar heavy lifting jobs in and around the port of New York, for ship salvage, and for use in the marine contracting business of its owner. It is a familiar sight along the eastern seaboard where large bridges and similar projects are under way.

According to the New York Edison Co., the two new frequency changers, with a third already in use, will be housed in a separate building now under construction and will be placed in service about Feb. 1, 1929, thus unifying the two systems.

Vessels Sold by Board To Private Operators

Establishment of a new American flag steamship line between South Atlantic ports of the United States to London and certain other European ports was provided by the United States shipping board through sale of three steel cargo vessels to F. D. M. Stracham, Savannah, Ga. The new line will serve primarily the Florida, perishable fruit trade, but the vessels are also equipped to handle cotton, grain and general merchandise. In making the sale on Nov. 23, the board is in complete understanding with the South Atlantic Steamship Co., recent purchasers of the Palmetto line.

In addition to the purchase price of $53,214 for the vessels the purchaser agrees to expend from $50,000 to $75,000 on each of the three ships for betterments and a total of $100,000 for additional repairs. The betterments consist largely in increasing the refrigerating space on the vessels.

The vessels sold for the new service are the steel refrigeration steamers ICE KING and MUSCATINE of 6103 deadweight tons each and the S. S. EASTERN SWORD of 5532 deadweight tons. With these vessels the purchaser guarantees the maintenance of at least 11 round voyages per year. Payment of the purchase price will be made on the usual terms, 25 per cent cash on delivery of the vessels with the balance payable over a period of seven and one-half years. The line as now planned will commence operations as soon as the vessels can be made ready. The ships are now laid up at New York.

Additional Ships on Pacific Coast

The shipping board on Nov. 23 authorized the sale of the S. S. WEST HARTS and the S. S. WEST HARTLAND for the sums of $95,000 and $120,400, respectively, to the States Steamship Co., Portland, Oreg., for operation between Portland and the Orient in connection with its operation of the Oregon-Oriental line recently acquired through purchase from the board. The sale of these vessels is on a cash basis. In purchasing these vessels, the States Steamship Co. agrees to increase the number of annual sailings guaranteed from 24 to 26. The WEST HARTS is now laid up at San Francisco, while the WEST HARTLAND is at Seattle.

The S. S. MOSHICO, a 5273-ton steel cargo vessel, was sold by the shipping board Nov. 23 to the Lykes Bros. Co. Inc., New Orleans, for operation on the purchaser's Gulf-West Indies service. Consideration for the sale was $25,000 cash. The vessel is now laid up at Orange, Tex.

Sale of the steamships WEST IRA and WEST IVIS to the Pacific Argentine Brazil line, San Francisco, was approved by the shipping board on Dec. 11. Sale of the vessels was for the consideration of $50,364.25 and $50,404.50 respectively under the same terms and conditions as those governing the sale of the line to its present owner. The purchaser agrees to increase the service of its line from ten to fourteen guaranteed round voyages a year and also to increase by one year the period of guaranteed operation.

The vessels are oil burning steel cargo ships of 8759 deadweight tons each. The purchaser will take delivery at New Orleans upon completion of repairs.

The shipping board is steadily getting rid of laid-up tonnage to private American operators.



ABOVE is a reproduction of the 1929 calendar issued by the Columbian Rope Co., Auburn, N. Y. The subject used as an illustration was painted by Charles Robert Patterson, famous marine artist. The scene portrays an old clipper ship, at dawn, just as she has been picked up by a tug some 30 or 40 miles at sea outside her port of destination.

Ask Bids on Two Ships For Ward Line

Leading shipyards of the country have been requested by the Atlantic Gulf & West Indies Steamship Co. to submit bids for the building of two fast passenger liners for the New York-Havana service of the Ward line, a subsidiary concern. Bids were to be opened Dec. 20, and contracts awarded as soon as possible.

Designed by Theodore E. Ferris, these new vessels are to have a speed of approximately 19 knots. From 22 to 24 months will be required for the building and when completed, the new ships will rank with the finest of their size afloat. They are to be twin screw vessels of 15,830 gross tons each with an overall length of 508 feet, molded beam of 69 feet 8 inches and a loaded draft of 26 feet. The bows of the two liners will be of the bulbous type, semi-cruiser stern, two funnels and two masts. There will be seven decks, four of which are to be for passengers and crew. The remaining three will be used as cargo space.

Regarding machinery for the vessels, shipyards have been requested to bid on single reduction turbine-drive, with high, intermediate and low pressure stages. The machinery is to develop 12,700 horsepower at 134 revolutions per minute with 15 per cent excess horsepower equal to 14,600 shaft horsepower at increased revolutions per minute.

Six Babcock & Wilcox boilers, divided four in one fire room, and two in another, with water tight bulkheads between will be fitted with mechanical draft for oil burning.

When completed, these two liners will replace the SIBONEY and ORIZABA now operating in the Havana run.

New Matson Line Ships

Post office and navy departments have approved plans of the Matson Navigation Co. for two fast passenger liners for the San Francisco-Australian service of the Oceanic & Oriental line.

Bids are to be asked in the near future for the ships which are to be 625 feet long and 77.5 feet beam, with a displacement of 26,000 tons, accommodations for approximately 700 passengers, and speed of 20 knots. The vessels are to be propelled by geared turbines operating twin screws and developing 26,000 shaft horsepower. Auxiliaries are to be electrically driven and the cost of the vessels is to approximate $13,000,000 a portion of which is to be loaned by the shipping board.

Late Flashes On Marine Disasters

Brief Summaries of Recent Maritime Casualties— A Record of Collisions, Wrecks, Fires and Losses

Name	Date	Nature	Place	Damage Resulting
Aconcagua	Sept. 14	Fire	Brooklyn	No. 5 hold
Ariel	Sept. 18	Collision	Pt. Judith	Propeller
Alessandro Podesta	Sept. 3	Struck buoy	Benghazi	Holed
Alix	Sept. 3	Collided quay	Leith	Stern; prop.
Auk	Sept. 5	Collision	London	Not stated
Aratimbo	Sept. 10	Disabled	Pernambuco	Propeller
American	Sept. 30	Aground	Nantucket	Leaking
Ashburton	Oct. 4	Aground	Columbia River	Not stated
Adolph	Oct. 3	Collision	Greens Bayou	Not stated
Afiena	Sept. 28	Collided embankment	Thames	Stem
Blackpoint	Sept. 19	Collision	Boston	Not stated
Benvrackie	Sept. 5	Disabled	Nr. Shadwin Isl.	Engine
Butt	Sept. 6	Collision	River Witham	Not stated
Bomarsund	Sept. 8	Aground	Odense	Not stated
Bavaria	Sept. 7	Aground	Foglo Gaddar	Total loss
Bartelme	Oct. 4	Ashore	Sturgeon Bay	Total loss
Bellepline	Sept. 20	Disabled	North River	Not stated
Bellhaven	Oct. 11	Collision	New York	Not stated
Baltic	Sept. 27	Ashore	Rosscarberry	Floated—bottom; keel
Bassildon	Sept. 26	Sprang leak	Gravesend	Sank
Clara Camus	Sept. 13	Collision	Gluckstadt	Bows
Covered Barge No. 25	Sept. 13	Sank	New York	
Copperfield	Sept. 16	Aground	Puerta Plata	Not stated
C. Maud Gaskill	Sept. 17	Ashore	Turks Island	Total loss
Christy Payne	Sept. 19	Aground	Off Brighton	Floated
City of Calcutta	Sept. 4	Fire	Hull	No. 2 hold
Clacton Belle	Sept. 3	Collision	Off Barking	Above water line
Castlemoor	Sept. 6	Fire	London	Considerable
Castilian Prince	Sept. 6	Struck obj.	Paranagua	Nos. 2 and 3 oiltanks
Claus Rickmers	Sept. 13	Collision	Nr. Gluckstadt	Considerable
Chiquimula	Sept. 25	Disabled	Charleston, S. C.	Leaking
Cambridge	Sept. 27	Disabled	New London	Lost rudder
Capt. Theodore Demaris	Oct. 1	Collision	New York	Sank
Celaeno	Oct. 2	Disabled	Lt. 46:10N, lon. 84:30W	Not stated
Dinteldijk	Sept. 15	Aground	Hook of Holland	Floated
Dominante	Sept. 3	Ashore	Cape Rizzuto	Floated
Dartmouth	Sept. 6	Sank	Dartmouth	
De La Salle	Sept. 10	Disabled	Havre	Propeller
Daisy	Sept. 12	Ashore	Arsenal Bank	Floated
D. A. Thomas	Sept. 19	Struck rock	Peace River	Sank
Darnholme	Sept. 19	Aground	Honningsvaag	Not stated
Daishin Maru No. 5	Sept. 25	Ashore	Nr. Otaru	Not stated
Edith	Sept. 14	Aground	San Juan	Not stated
Estelle Krieger	Sept. 20	Aground	Port Johnson	Not stated
Eastern Temple	Sept. 21	Disabled	Off Cape Fear	Machinery
Eurana	Sept. 18	Disabled	New York	Steering gr.
Elizabeth Bromley	Sept. 6	Collision	River Witham	Port bow
Edward A. Ryan (canal boat)	Sept. 26	Sank	Nr. Troy	
Eolo	Sept. 20	Collision	Nr. Island Vizcaino	Sank
Fred Cleeves	Sept. 6	Disabled	Swansea	Engine
Felipe	Sept. 24	Ashore	Amazon River	Floated
Franklin	Sept. 28	Sank	Off Clason Point	
Fontana	Oct. 11	Ashore	Nr. Sturgeon Bay	Floated — leaking
Framlington Court	Oct. 10	Ashore	Wood Island, N. S.	Not stated
Goathland	Sept. 10	Collision	Monte Video	Fore quar.
Guetaria	Sept. 10	Ashore	Hernosand	Not stated
Gaston	Sept. 22	Collision	New Orleans	Considerable
Gallier	Sept. 17	Aground	Ils. of Anticosti	Floated
Huron	Sept. 16	Aground	Puerto Plata	Not stated
Henry D. Whiton	Sept. 22	Collision	East River	Bow
Hua Shan Maru	Sept. 3	Collision	Tientsin	Deck
Howick Hall	Aug. 29	Collision	Rosario	Starboard side
Hanley	Oct. 6	Collision	So. of New York	Bows
Harperley	Sept. 24	Aground	Buenos Ayres	Floated
Ingaro	Sept. 12	Disabled	London	Steering gr.
Isabella	Sept. 3	Fire	Nr. Blufton	Considerable
Ines	Sept. 24	Collision	Santos	Not stated
J. T. Morse	Sept. 13	Struck ledge	Off Rockland	Leaking
Josey	Sept. 2	Fire	Maracaibo	Considerable
J. P. Morgan	Sept. 27	Aground	Conneaut	Floated
Jutland	Sept. 13	Disabled	Glasgow	Engine
J. C. Donnell	Oct. 1	Disabled	Philadelphia	Engine
John Llewllyn	Oct. 9	On rocks	Off Square Isl.	Total loss
Jumieges	Sept. 26	Aground	Rouen	Floated
Kentuckian	Sept. 22	Collision	Off Point Sur	Port side
Keizan Maru	Sept. 3	Collision	Tientsin	Upper works
Kyokkoh Maru	Sept. 12	Ashore	Tokio	Floated
Kozan Maru	Sept. 27	Ashore	San Francisco	Not stated
Kangean	Sept. 15	Fire	Amsterdam	Not stated
Lillian	Sept. 15	Aground	Puerto Plata	Considerable
Lincoln Ellsworth	Sept. 19	Collision	River Mersey	Bows; frames
Lottie	Sept. 19	Sank	Delaware	
Livingstonia	Sept. 20	Aground	Martinique	Floated
Logician	Sept. 21	Disabled	Panama Canal	Propeller
Los Alamos	Sept. 22	Collision	Off Pt. Sur	Stem

Name	Date	Nature	Place	Damage Resulting
Llandaff	Sept. 13	Collision	Off Rosherville	Stern
Loubryne	Sept. 24	Struck pier	Halifax	Not stated
Lygnern	Sept. 19	Aground	Perth	Not stated
Levnet	Sept. 27	Heavy gale	Oulu	Aground
Minnewaska	Sept. 17	Collision	Thames river	Starboard side
Mellanear	Sept. 4	Ashore	Peel Rock	No. 2 hold
Maria Pinango	Sept. 2	Disabled	Bermuda	Boilers; smokestack
Maule	Sept. 8	Not stated	Columbine Pt.	Total loss
Meerkerk	Sept. 10	Fire	Lisbon	Not stated
Mesopotamia	Sept. 10	Disabled	Cadiz	Boiler; steampipe
Marianne	Sept. 12	Not stated	Cuxhaven	Leaking
Martha	Sept. 12	Disabled	Ymuiden	Propeller
Michael E. Tricoglu	Sept. 12	Aground	Sulina	Not stated
Monterey	Sept. 12	Fire	Merida	Not stated
Manasoo	Sept. 16	Sank	Georgian Bay	
Marguerite	Oct. 3	Aground	Marcus Hook	Floated
Maggie	Sept. 25	Sank	Off Helford River	
Midland City	Sept. 24	Sank	Midland	
Mishima Maru	Sept. 25	Collided whf.	Sydney	Bow plates
Macroom	Sept. 27	Collision	Gravesend	Starbd. bow
Mont Agel	Sept. 25	Collision	Dakar	Plates
Newport	Sept. 18	Disabled	Lat. 30:00N, lon. 35:00 W.	Lost prop.
Nevesinje	Sept. 10	Aground	Valparaiso	Damaged
Nassauvian	Sept. 20	Ashore	Coro	Motors; keel rudder
Norfolk	Sept. 19	Collision	Middlesbro	Not stated
Otho	Sept. 19	Collision	Boston	Plates
Older	Sept. 20	Collision	Montreal	Amidship
Olympier	Sept. 20	Collision	Nr. Isl. Vizcaino	Not stated
Oliva	Sept. 20	Aground	Glasgow	Not stated
Orleans	Sept. 29	Ashore	Off Shooters Isl.	Floated
Orkanger	Oct. 10	Disabled	Key West	Machinery
Orvieto	Sept. 25	Collided pier	Barry Island	Not stated
Pleidaes	Sept. 18	Disabled	St. Johns, N. F.	Rudder
Peebles	Sept. 3	Aground	Hooghly	Steering chains; condensers
Panther	Sept. 5	Collision	London	Starboard bow
Parma	Sept. 12	Ashore	Off Delfzyl	Not stated
Pechelbronn	Sept. 20	Disabled	Havre	Boilers
Persevera	Sept. 27	Aground	Nr. Vlaardingen	Floated
Rolfe	Sept. 13	Storm	Diligent River	Badly
Rose	Sept. 27	Collided jetty	Gravesend	Sank
Rozan Maru	Sept. 27	Ashore	Aberdeen	Floated
Stimson	Sept. 21	Ashore	Grand Cayman	Total wreck
Shreveport	Sept. 12	Explosion	Southport	Not stated
Snefjeld	Sept. 12	Aground	Nr. Archangel Bar	Floated
Sinsinawa	Sept. 22	Collision	Naples	Propeller
Smith & Terry	Sept. 20	Gale	Norfolk	Aground
Stonepool	Sept. 28	Disabled	Lat. 50:39N. long. 14:36 W	Steering gr.
Susu	Sept. 19	Struck bar	Boiseys Bay	Propeller
Sachem	Oct. 8	Fire	St. Clair River	Total loss
St. Tammany	Sept. 29	Fire	Mandeville, La.	Total loss
Stonepool	Oct. 1	Disabled	Off Berehaven	Steering gr.
Solitaire	Oct. 1	Aground	West Point	Floated
Skinfaxe	Sept. 25	Disabled	Nr. Lerwick	Not stated
Sambre	Sept. 27	Collision	Rio Grande	Not stated
Triona	Sept. 14	Fire	New York	No. 1 hold
Terne	Sept. 15	Aground	Puerto Plata	Not stated
Theriault	Sept. 14	Gale	Halifax	Leaking
Tientsin Maru	Sept. 3	Collision	Tientsin	Bow plates
Telemachus	Sept. 13	Collision	Off Rosherville	Starboard side
Tebe	Sept. 14	Struck bk-water	Cacliara	Bottom
Tromoy	Sept. 19	Struck sub. object	Bo'ness	Propeller
Thistleben	Oct. 6	Collision	So. of New York	Sank
T. K. Bentley	Oct. 9	Collision	Off Gloucester	Considerable
Tista	Sept. 20	Ashore	Holmengraa	Total loss
Trevean	Sept. 24	Collision	Santos	Not stated
Torne	Sept. 24	Stranded	Nr. Bastuholmen	Floated
Umona	Sept. 6	Struck obj.	Gravesend	Propeller
Ursula Rickmers	Sept. 6	Disabled	Malta	Machinery
Vestalia	Sept. 17	Collision	New York	Damaged
Vesuvio	Sept. 20	Collision	Montreal	Stem
Victory	Oct. 9	Disabled	Wilmington	Not stated
Waldtdaut Horn	Sept. 15	Aground	Puerto Plata	Not stated
Wendy	Sept. 17	Collision	Thames River	Not stated
Wm. A. Naugler	Sept. 16	Ashore	Salt Cay	Total loss
Willbabco	Sept. 19	Disabled	So. of Cape Henry	Leaking
Wachtfels	Sept. 4	Fire	Calcutta	Not stated
Wenchow	Sept. 11	Ashore	Shanghai	Floated
Westerdijk	Sept. 20	Aground	Nr. Schiedam	Floated
Worrell Clarkson	Sept.	Struck bk-water	Fairport	Shoes; rud.
Westmoreland	Oct. 8	Fire	Galveston	Not stated
White Cdest	Sept. 24	Aground	Punta Indio	Not stated
Yacht	Sept. 19	Ashore	Off Atlantic Highlands	Not stated
Zenith City	Oct. 10	Aground	Soo	Floated

Reviews of Late Books

The Prismatic Compass and How To Use It, translated from the French of Paul Deriaz of Geneva, Switzerland, by Major A. D. St. G. Bremner, M. C. Royal Engineers, London; cloth, 80 pages, 4 x 6¼ inches, published by E. R. Watts & Son, London, and furnished by MARINE REVIEW, Cleveland, for $0.50 postpaid, and in London by the Penton Publishing Co. Ltd., Caxton House, London, for 2s.

The book is divided into three parts. Part I explains in detail the principle of the magnetic needle and presents a short description of some of the latest types of instruments available for all purposes, including the different types of liquid compasses. This section treats also of such subjects as magnetic attraction, variation, or declination, magnetic charts, calculation for magnetic variation, etc., touching upon the subject of airplane compasses.

Part II contains a clear and simple explanation regarding the manner of using the compass for solving problems which may arise when marching or navigating through strange territories. Practical examples of the use in each case are presented. Other subjects treated in the second section include taking magnetic bearings, problems, in errors and testing, the method of computing the total deviation and variation of a compass and the conversion of magnetic to true bearings and vice versa. The effect of ore deposits and similar substances on the compass are described.

The third and last part demonstrates original and ingenious methods of range finding and determining the distance between two inaccessible objects by triangulation, requiring no more knowledge than the four rules of arithmetic. Triangulation for sketching purposes is described in detail. Base line and angle measurement is treated in this section.

The book is of value not only on account of its information for mariners and military operations but is also of benefit to anyone directly or indirectly interested who seeks a clear discussion of the subject.

Patents, Law and Practice, by Oscar A. Geier, cloth, 46 pages, 5¾ x 8¾ inches, published by Richards & Geier, patent and trademark attorneys, New York City, and furnished by MARINE REVIEW, Cleveland. The book is for free distribution.

The work is a clarifying treatment of the subject of patents and related topics, covering the various phases of legal procedure and discusses the rules of practice regnant in the United States patent office, completely outlining the various changes in these rules since the third edition of the book left the press in 1924.

In the opening pages of the book, the author presents a digest of the law and practice relating to patents, trademarks, and copyrights, pointing out what may be patented and by whom, also presenting the details governing patent procedure, such as application, specifications, claims, infringements, interferences, reissues, appeals, disclaimers, ownership, design patents, trademarks, copyrights, etc. The subject of foreign patents is touched upon and the importance of foreign protection to inventors stressed.

In the closing pages of the book the charges for the various services pertaining to patents are tabulated, this tabulation including the fees in force in foreign countries.

The book is of especial value in giving up-to-the-minute information to lawyers, manufacturers, merchants and to those generally interested in the subject of patents.

Brown's Nautical Almanac, cloth, 710 pages, 5½ x 8½ inches, published by Brown, Son & Ferguson Ltd., Glasgow, and furnished by MARINE REVIEW, Cleveland, for $14.50 postpaid and in Europe by the Penton Publishing Co. Ltd., Caxton House, London, for £3 net.

The almanac for 1929 is the 59th issue of this annual publication which has come to be considered a very necessary and vital part of the navigator's equipment. Facility in arrangement of material and trustworthiness of tabulated information which may be relied upon for the secure guidance of the vessel have contributed immeasurably to the general popularity of the almanac.

Information regarding practically every subject of interest to the mariner is presented within the pages of the volume. Shipowners, shipyard officials and those generally concerned with maritime questions find the publication invaluable.

Particular attention is drawn by the publishers to some modifications and additions which have been made in some of the five sections of the astronomical ephemeris of the almanac. These changes have necessitated the introduction of a comprehensive table of proportional parts to facilitate interpolation and obtain a more reliable degree of accuracy. The addition of this proportional-parts table together with the inclusion of a complete set of pole star tables has made possible the obtainment of results at a glance and has served to reduce computation to a minimum.

Two new quantities have been introduced into the nautical astronomy to facilitate certain operations concerning the inconveniences due to the changing of the astronomical day from noon to midnight. These new quantities are tabulated in section III of the astronomical ephemeris.

By keeping in close touch with present-day advances in nautical science and maritime practice, the publishers have been enabled to provide a thesaurus of practical knowledge indispensable to those who follow the sea. The factor which has probably more than anything else to do with the popularity of the almanac is that much of the information therein contained has been presented by the experienced for the benefit of the inexperienced.

Steam Tables, Properties of Saturated and Superheated Steam, paper, 18 pages, 4½ x 6¾ inches, published by the Superheater Co., New York and Chicago, and furnished by MARINE REVIEW, Cleveland, and in Europe by the Penton Publishing Co. Ltd., Caxton House, London. The book is for free distribution.

In appearance and arrangement this edition, the seventh, is similar to the sixth, published in 1925. This new issue, however, has been completely revised and all tables have been carefully checked. A great deal of new material has been added and existing data have been thoroughly revised in order to be consistent with the most modern practice in steam power plants. The steam tables have been extended. Many new boilers have been added to the section on boilers and all boiler data were checked with the co-operation of the individual manufacturers.

The steam tables state the properties of saturated and superheated steam in convenient form, from 0.0086 to 3300 pounds, absolute pressure. These tables have been compiled from Marks and Davis A. S. M. E. committee on properties steam and extension of the steam tables and Stogola are in line with the present-day demand for information on the higher pressures. A very convenient heat-entropy diagram is included in the book.

Marine Review

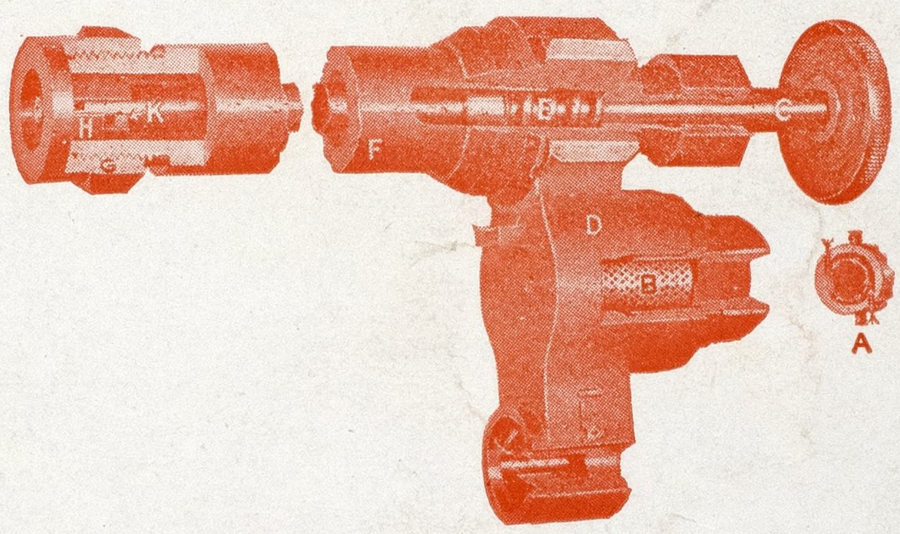
Reg U.S. Pat. Off.

The National Publication Covering the Business of Transportation by Water

January, 1929

COEN Combustion Engineers

Mechanical Type "A" Fuel Oil Burner



The COEN Mechanical Atomizing Burner has that simplicity and flexibility of control that insures real fuel economy.

By simply turning the handwheel the fireman can increase or decrease the intensity of the fire as occasion demands.

Complete information and data gladly supplied on request.

Coen Company, Inc.

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Los Angeles

112 Market St.
San Francisco

50 Church St.
New York, N. Y.

"Rung up January, 1927 . . . hasn't stopped yet"



The Tug B. M. Thomas, Nelseco-equipped, does the work of two steam tugs—*operates more cheaply than one*

THE quoted line above was the cryptic answer of the master of the B. M. Thomas, powerful Nelseco-equipped tug of the Hainesport Mining and Transportation Company of Philadelphia, when asked about her performance.

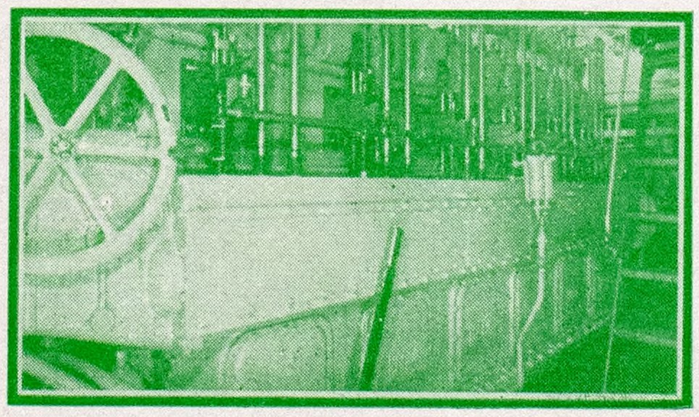
Not literally true, of course. Yet since her delivery by the New London Ship & Engine Company in December, 1926, the B. M. Thomas has been on regular schedule; has never lost an hour's time through engine trouble; has always been ready to go except during regular winter overhaul. Today this tug does the same work that formerly required the services of two steam tugs.

The regular trip of the B. M. Thomas is from the Delaware side of Philadelphia, down to League Island and up the Schuylkill side to Fairmont Dam—a distance of about forty miles. She makes this run towing from five to seven scows, each carrying from five hundred to one thousand tons of cargo.

With every ebb tide during six days of the week the B. M. Thomas moves down the Delaware. When she turns into the Schuylkill, bucking the tide up river with her heavy load, a real fight begins. The scows are frequently consigned to different wharves and to distribute them may require one hundred and fifty starts of the engine in an hour and a half. Seven or eight light scows may then have to be picked up quickly in order to save flood tide on the return up the Delaware. So efficiently does the B. M. Thomas do this that she often has a couple of hours to spare. Many times her steam predecessors did not reach the mouth of the Schuylkill until after the tide had turned ebb in the Delaware. This meant ten miles of ebb tide to buck—delay to both the trip on hand and the next one.

No delays from engine trouble

Mechanical trouble with the engine of the B. M. Thomas has been negligible. A spare exhaust valve is carried and used each week or ten days to replace a valve in service. The valve taken out is then overhauled and made ready for the next replacement. By this method a complete change of exhaust valves is accomplished about once in two months. The intake valves run six to eight months without requiring attention. Thus the work of keeping the engine in condition is not great.



Saving time—saving money

The B. M. Thomas' actual fuel cost per month (24-hour operation) amounts to $250 as compared with the approximately $1200 fuel bill for a similar oil-burning steam tug—a direct saving of $950 per month. A thirty-six to forty-eight hour saving in time per month is accomplished through quick fueling and the elimination of boiler washing. *It requires only one hour per month to fuel the Nelseco-equipped boat.* The owners of the B. M. Thomas claim a saving equal to the cost of operating one steam tug because of the better adaptability of the Nelseco Diesel engine to the boat's specific job.

Able to replace two steam tugs—to operate more cheaply than one—to be ready for her regular runs six days every week—to save time and money for her owners—the B. M. Thomas has definitely established Nelseco superiority on the Delaware and Schuylkill Rivers.

For full information on Nelseco Diesel Engines write for catalog M. R.

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NEW LONDON SHIP AND ENGINE COMPANY

Groton, Conn., U. S. A.

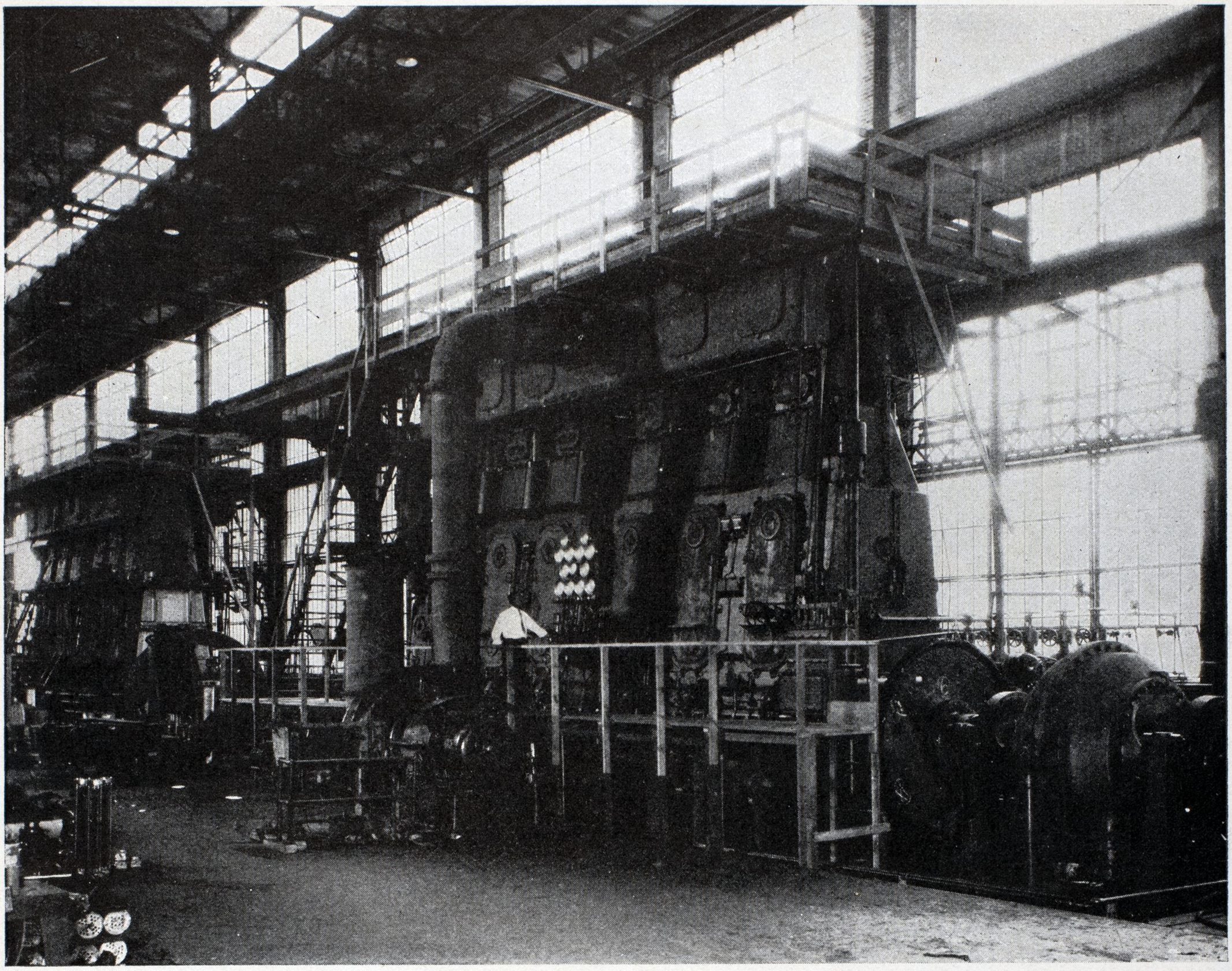
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Vol. 59, No. 1, January, 1929, issue of MARINE REVIEW, published monthly at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, Ohio, under the act of March 3, 1879. Subscription price $3.00 a year in U. S.; Canada, $4.00; Great Britain, £1; single copies, 35c.



14,000 B. H. P.-Diesels on Test Bed Including 2-4000 B. H. P. Shown Above

FUEL main engine .40 Equivalent total
Ship Fuel .43 per S. H. P.

LLOYD'S Reports (Sept. 30, 1928) World Marine Engines Under Construction:

249 Steam Reciprocating Engines	414,001 I. H. P.
33 " Turbines (excluding Germany)	345,500 S. H. P.
364 Diesels	1,281,178 I. H. P.

New American Ships must compete with these foreign motorships for the next 25 years — buy fuel in the same ports on long trade routes — accept the same rates.

The Preponderance Of Foreign Diesels Over Steam Demands Your Consideration

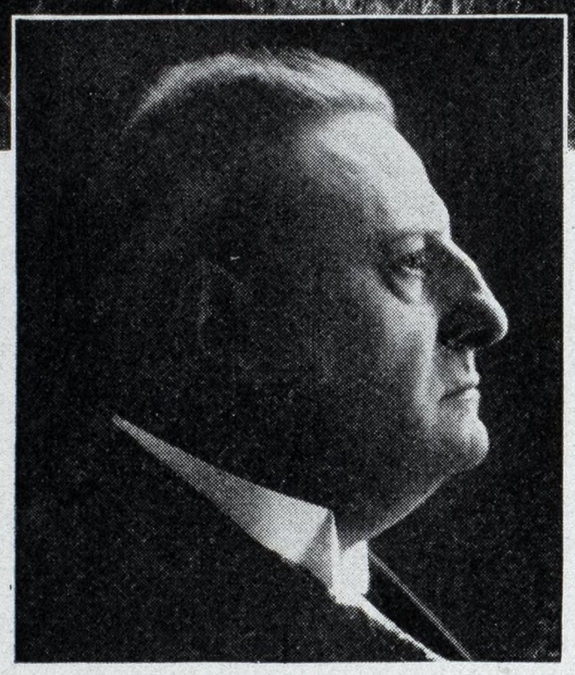
BUSCH-SULZER

BUSCH-SULZER BROS.-DIESEL ENGINE CO.

St. Louis, Mo.



S. S. Rotterdam of the Holland-America Line on a Mediterranean cruise. She is passing the Towers of Europe in the Straits of the Bosphorus while on her way to the Black Sea



Chief Engineer J. G. Bolsius

"71 days of delightful diversion" and correct lubrication

On February 7 the luxurious *S. S. Rotterdam* sails from New York on her eighth annual cruise to the Mediterranean and adjoining countries. "71 Days of Delightful Diversion" are promised to a limited passenger list by the Holland-America Line in advertising this new luxury cruise.

Chief Engineer J. G. Bolsius will contribute largely to the fulfillment of this promise. It is his responsibility to see that the *Rotterdam's* powerful engines function perfectly —that no inconvenience or annoying delay is caused by trouble in the engine-room.

Well aware of correct lubrication's vital importance in efficient engine operation, this capable supervisor of the *Rotterdam's* mighty power plant will again rely on the high quality of Gargoyle Marine Oils as his best insurance against untimely breakdowns.

Chief Engineer Bolsius is one of the many marine engineers who have learned from experience that Gargoyle Marine Oils increase engine efficiency, reduce oil consumption, conserve fuel, and save time and money by keeping costly repairs at a minimum.

Gargoyle Marine Oils are on sale in more than 300 of the world's leading ports. And at each of these is a Vacuum Oil representative, thoroughly acquainted with all types of marine machinery. He will welcome an opportunity to aid in solving your lubrication problems.

NOTE: Our authoritative treatises, "Steamships with Reciprocating Engines" and "Turbine Propelled Steamships," may be obtained, without obligation, by writing to Marine Department, Vacuum Oil Company, 61 Broadway, New York City.

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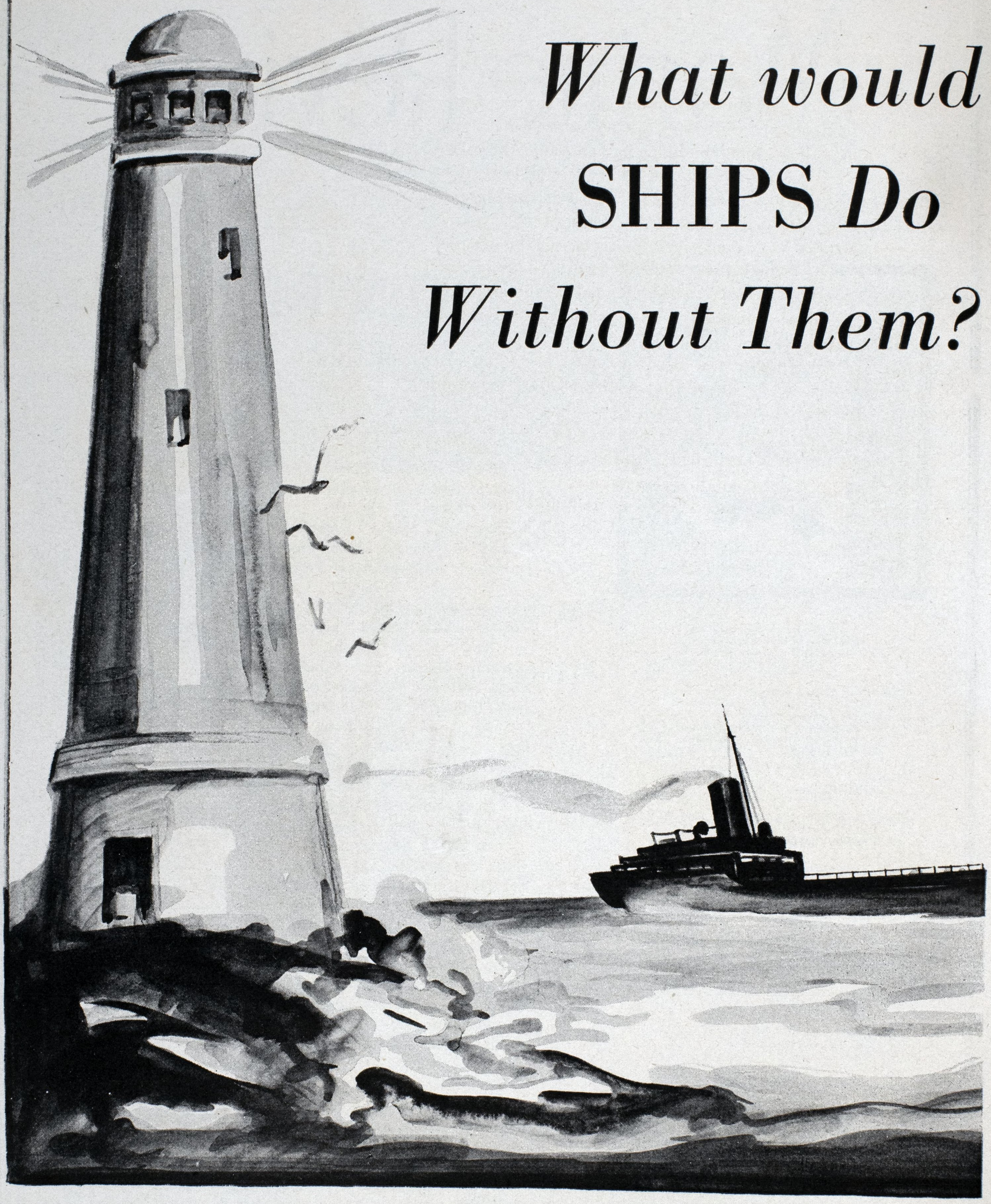
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Buffalo Dry Dock Company

UNCLE SAM and the big ship building and repair companies are everywhere on the Great Lakes. Each is a vital necessity to lake shipping. Each has grown in equipment and manpower step-by-step with your growing needs.

It is impossible to imagine Lake navigation without the lighthouses, buoys, channel markers and other aids we take for granted. It is equally impossible to imagine Lake traffic without the big dry-docks, foundries, forges, planers, boring mills and lathes—the engineers, architects, draftsmen and skilled workmen—which the completely equipped ship building companies alone provide. Someone must be able to repair the hurrying ships—wherever they may be—without delay and without limit.

Ship operators know the necessity for these immense repair resources. They know that someone *must* maintain them, even though some of this expensive equipment is used but a few times a year. That is why operators are turning to the completely equipped ship building companies for all their repair work—small jobs as well as big ones.



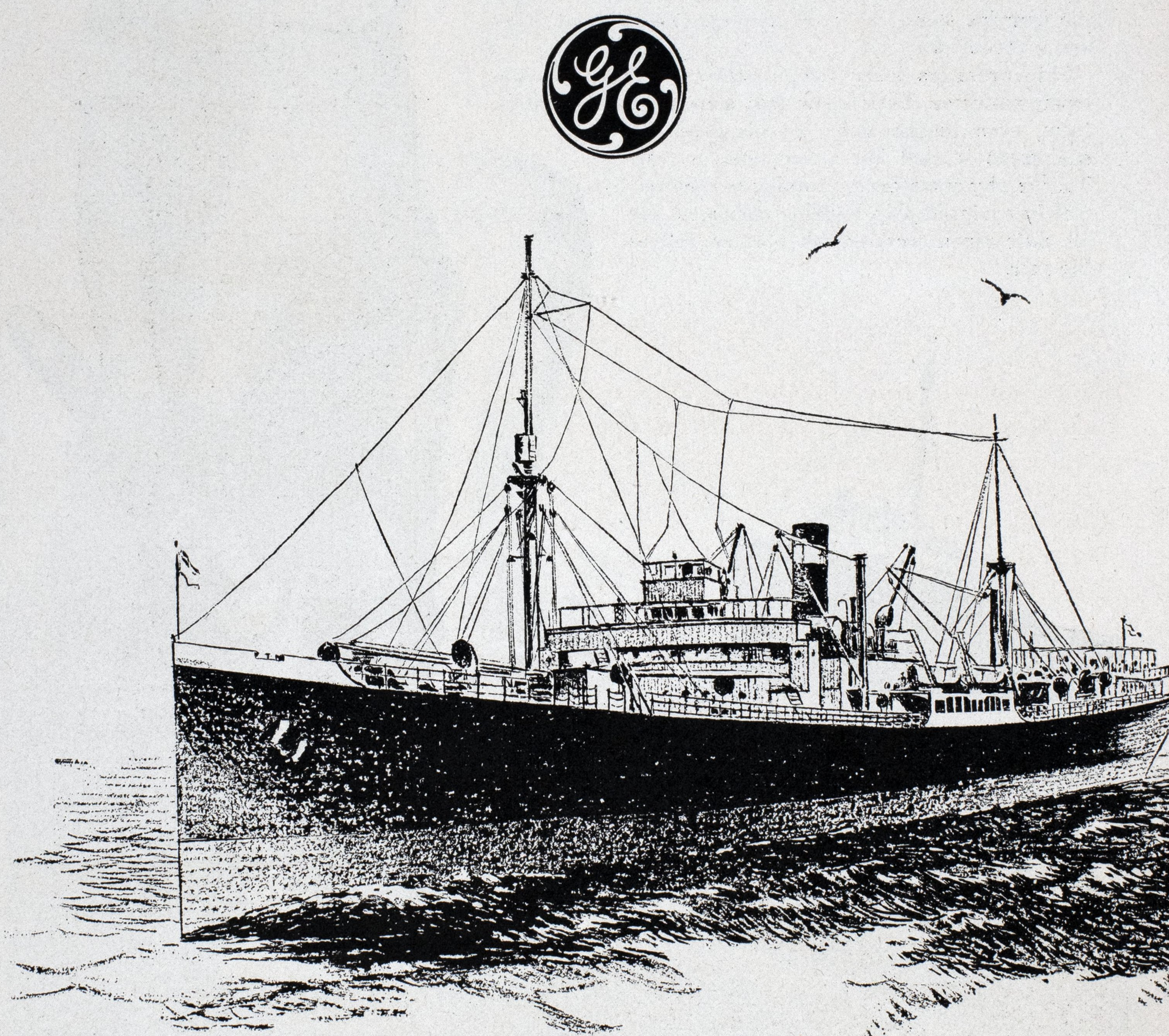


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GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

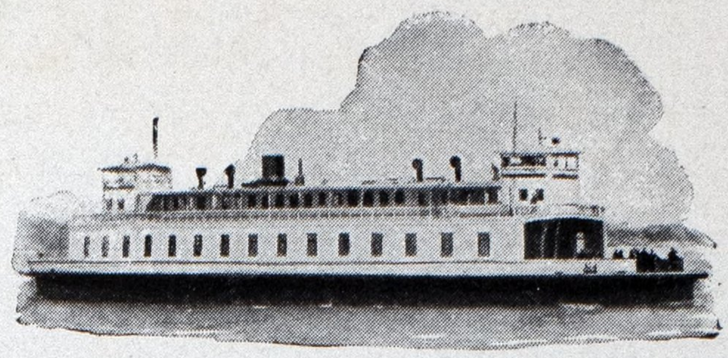
LESS than a decade ago, Diesel-electric drive was but an experiment. To-day, Diesel-electric ships are establishing notable records on river, lake, and ocean. In tugboats, tankers, ferries, dredges, coast-guard cutters, as well as many other vessels, the advantages of this type of drive have been abundantly proved.

The ***Courageous*** marks an important advance in this development. It is the largest vessel on which Diesel-electric drive has yet been installed, with greater s.hp. capacity than any other Diesel-electric vessel now afloat.

To each of the four McIntosh and Seymour Diesel engines are connected an 800-kw. main generator and a 100-kw. auxiliary generator.

These furnish power for the two 2000-s.hp. main propulsion motors and for the operation of the ship auxiliaries.

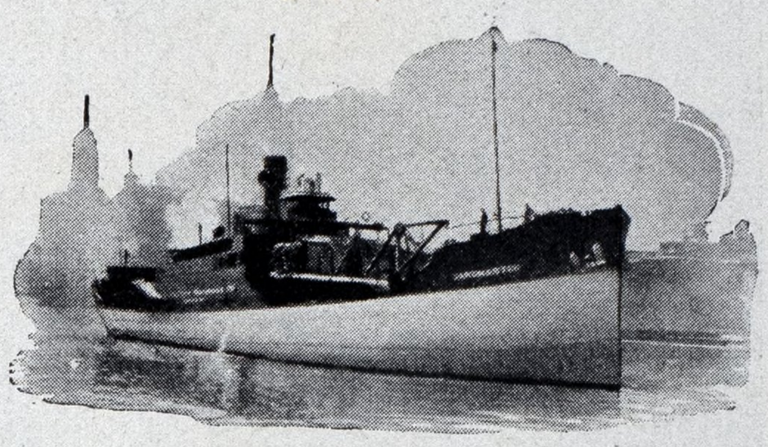
General Electric designed and furnished both the main propulsion generators and motors as well as the switchboards and electric equipment for deck and under-deck auxiliaries.



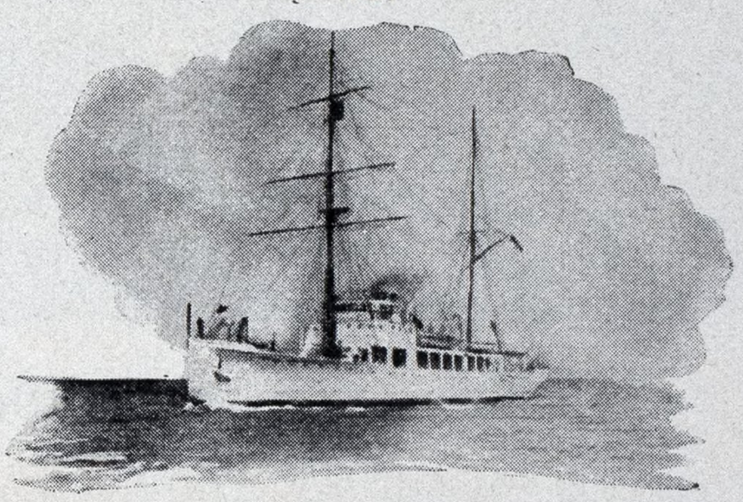
Ferry **Golden Gate** *placed in service in 1922*



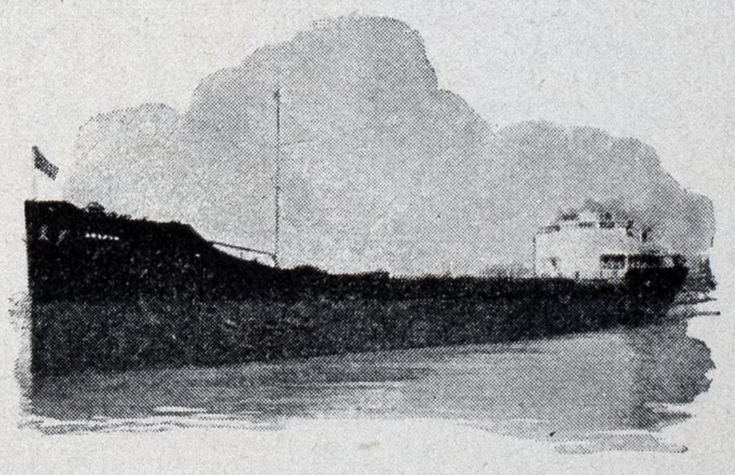
Tugboat **Van Dyke No. 3** *placed in service in 1924*



Dredge **Sandmaster** *placed in service in 1926*



Coast-guard cutter **Northland** *placed in service in 1927*



Tanker **Sharon** *placed in service in 1927*

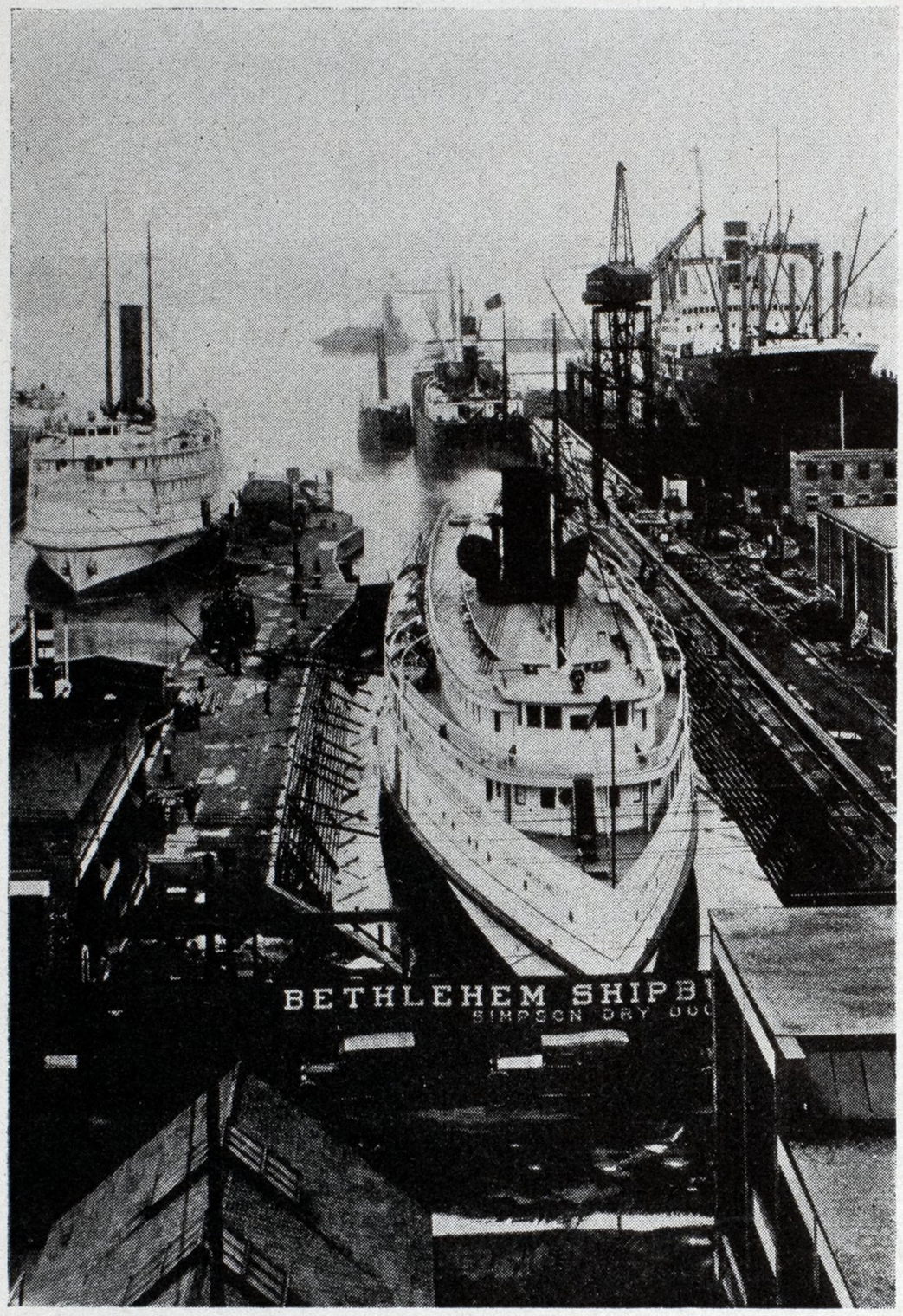


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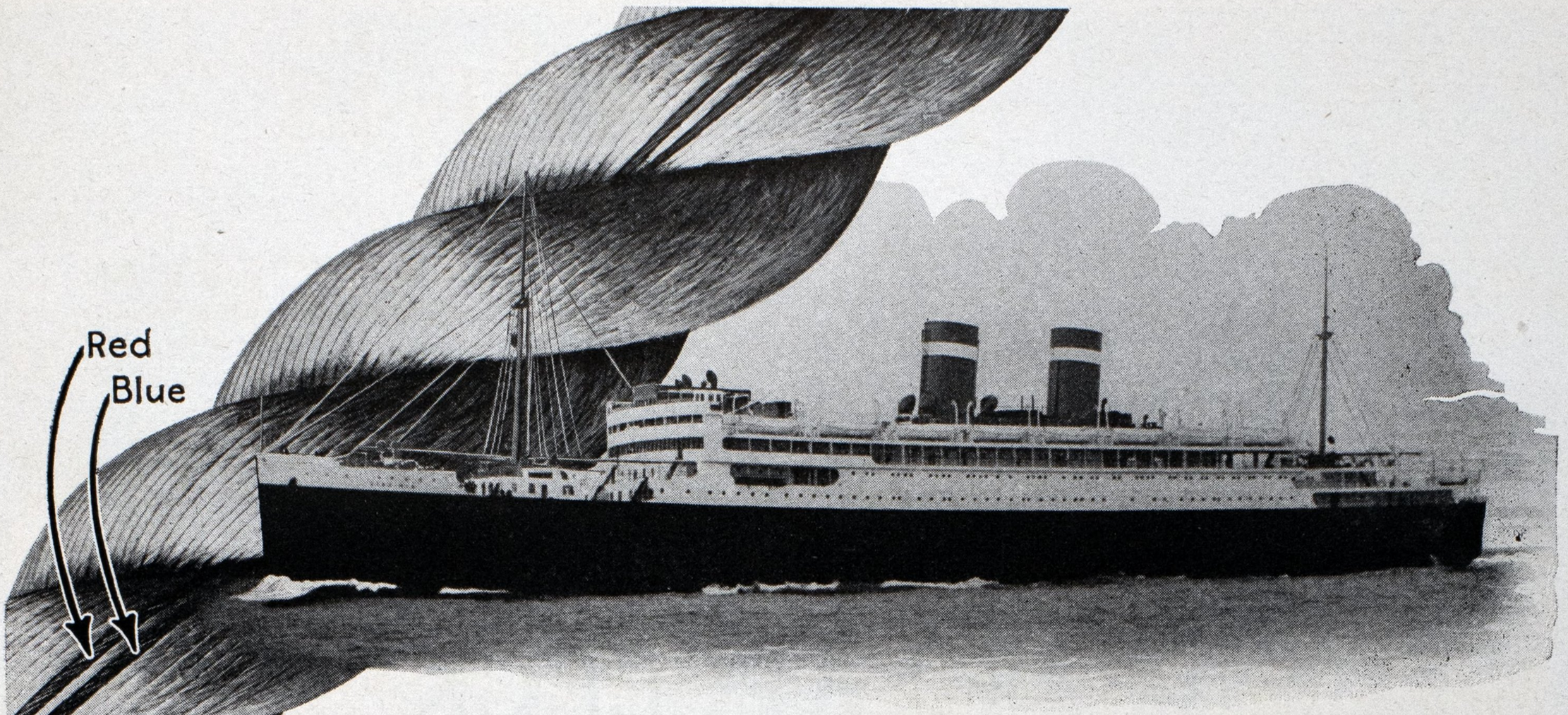
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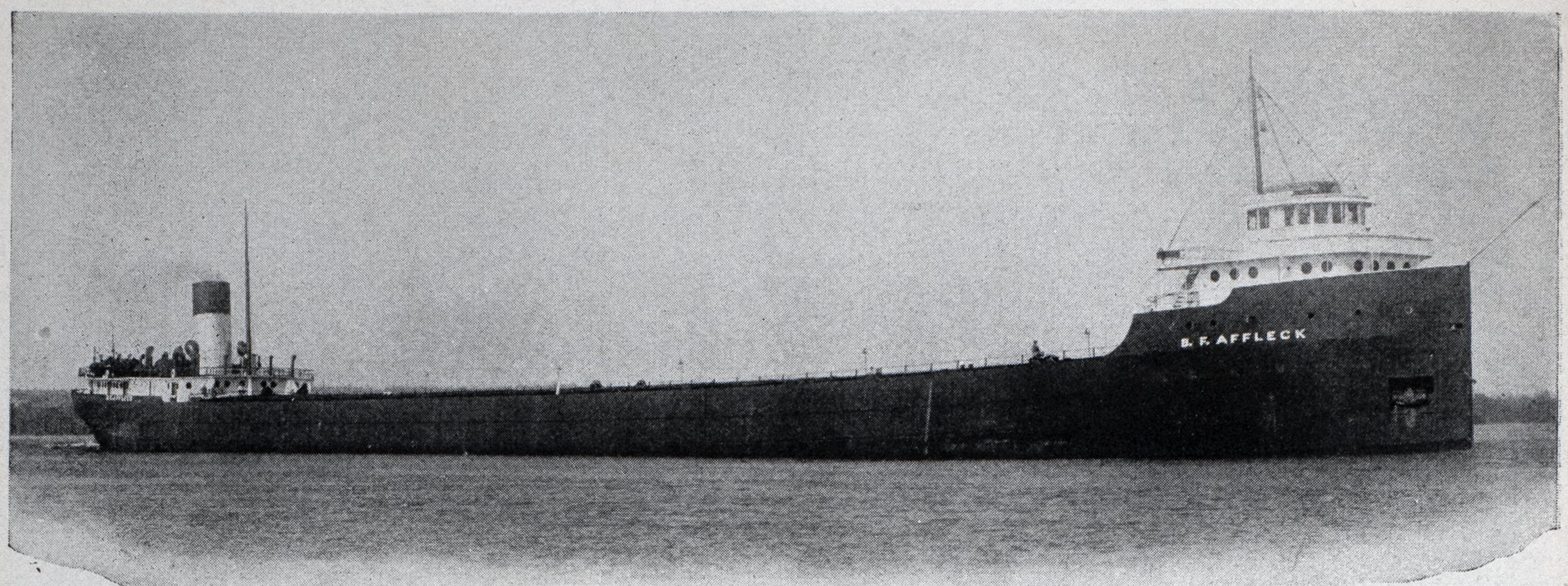
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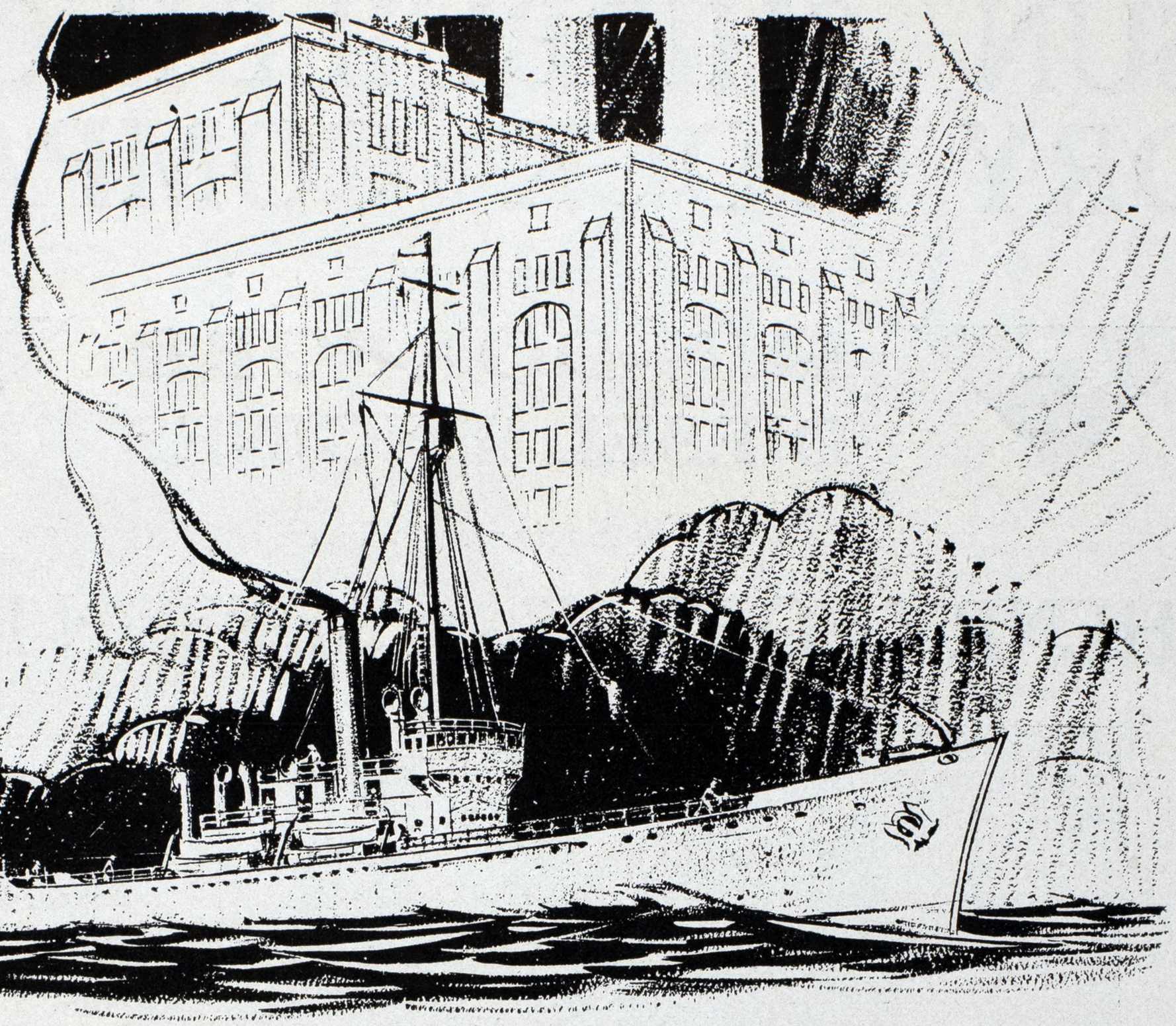
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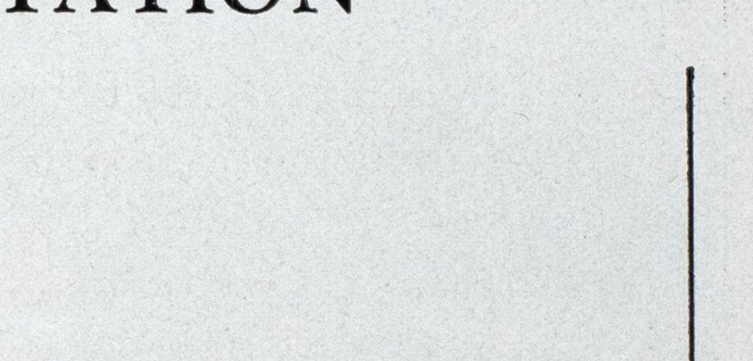
With the recent launching of the turbine electric Coast Guard Cutter Chelan, that goal, to all practical purposes, has been attained. This vessel, whose machinery is designed after the shore power plant, has shown a saving of 7 per cent in total fuel consumption for all purposes.

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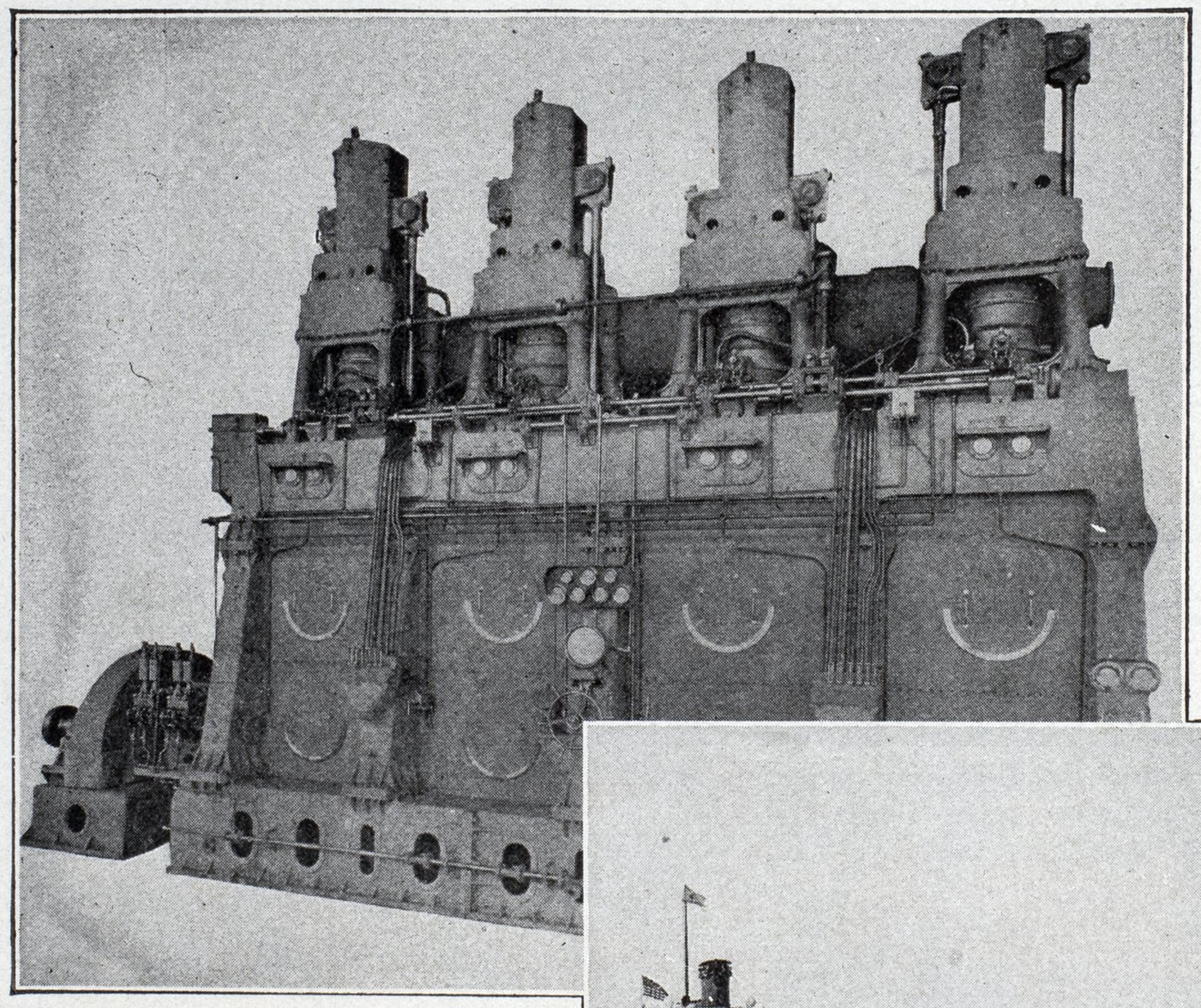


SUN-DOXFORD DIESEL ENGINES

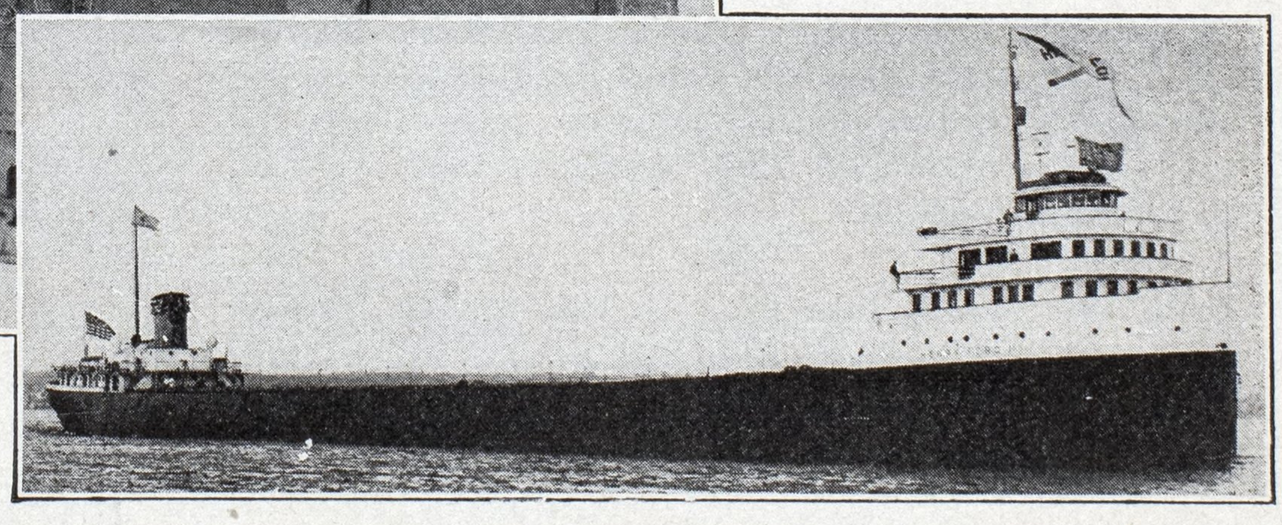


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3000 S. H. P. Sun-Doxford Diesel Engines power the two motorships, "Henry Ford II" and "Benson Ford".



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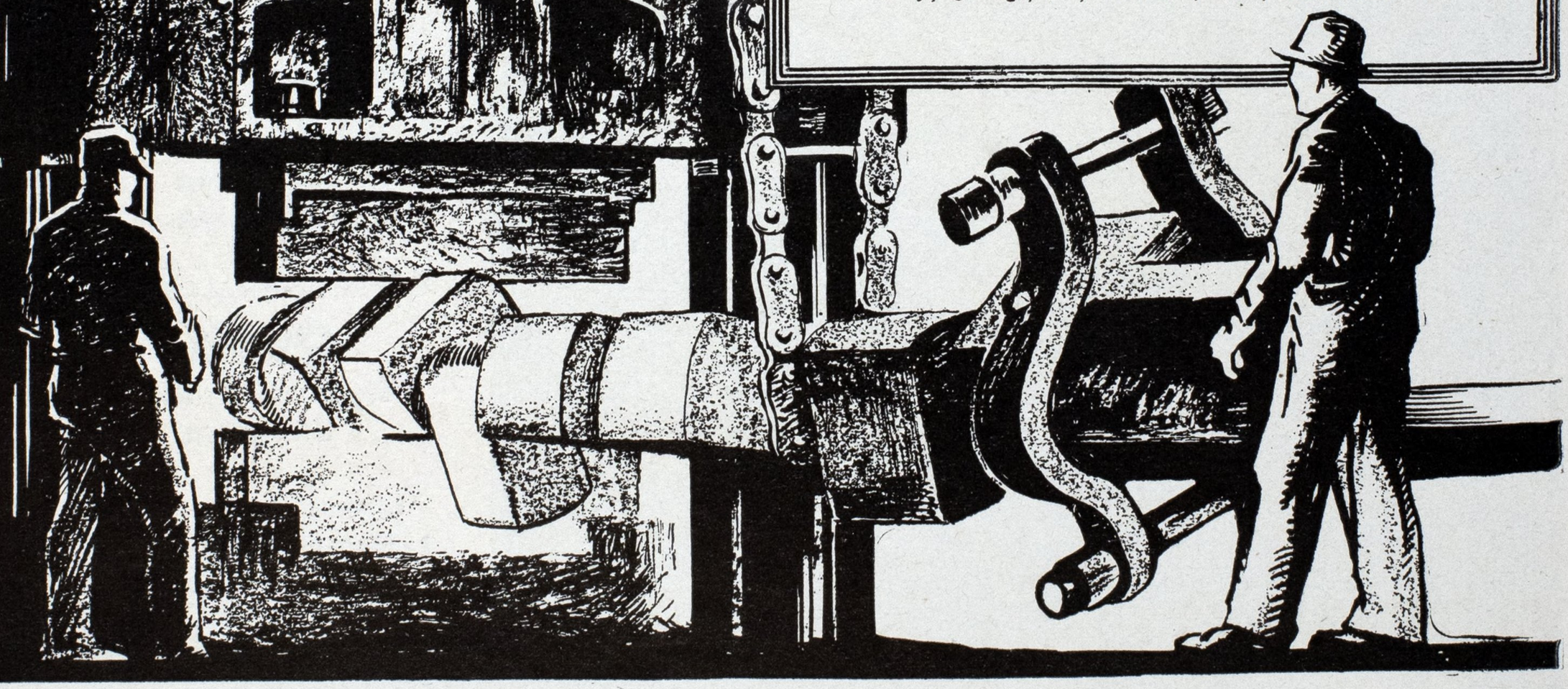
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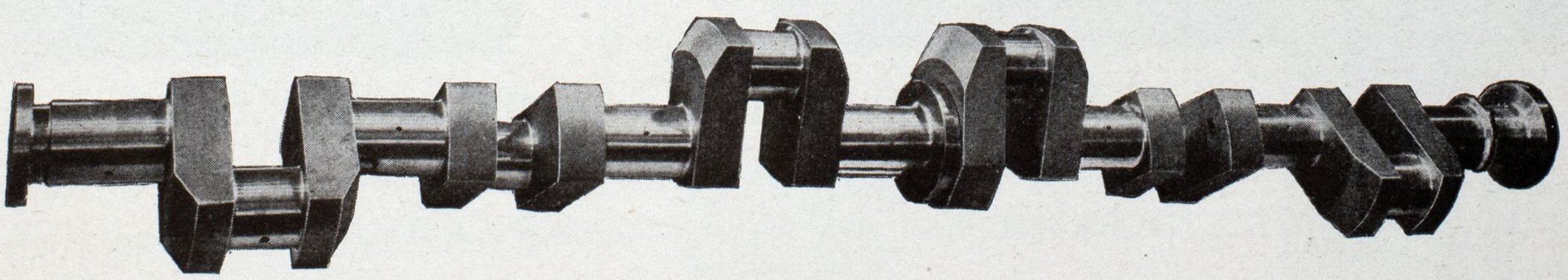
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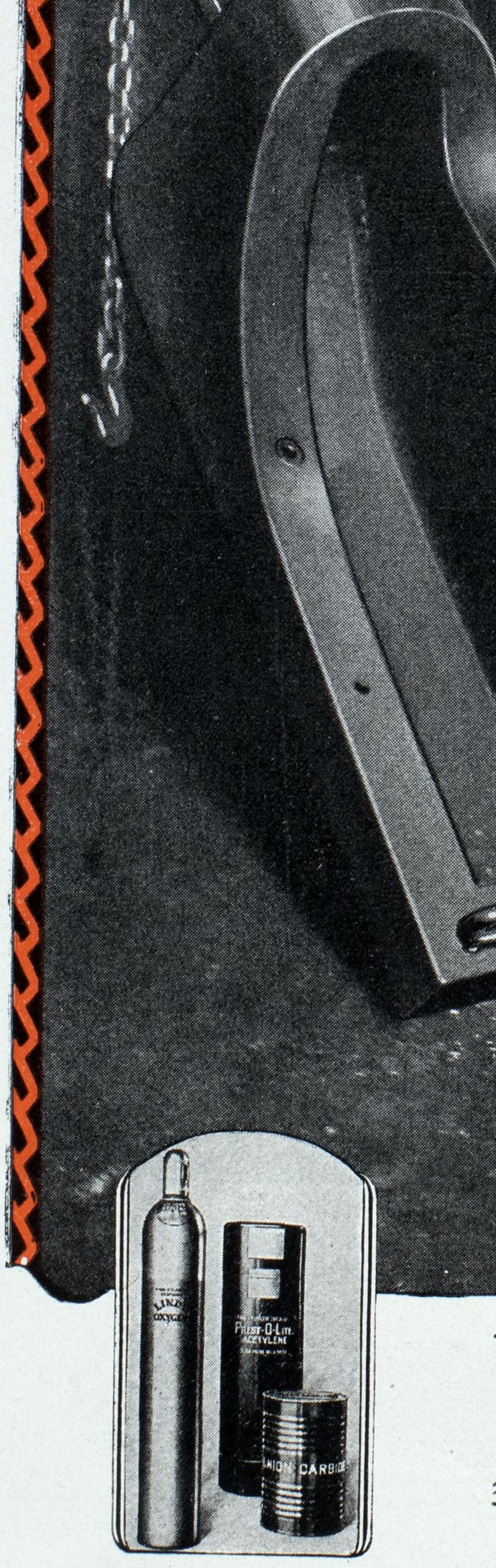




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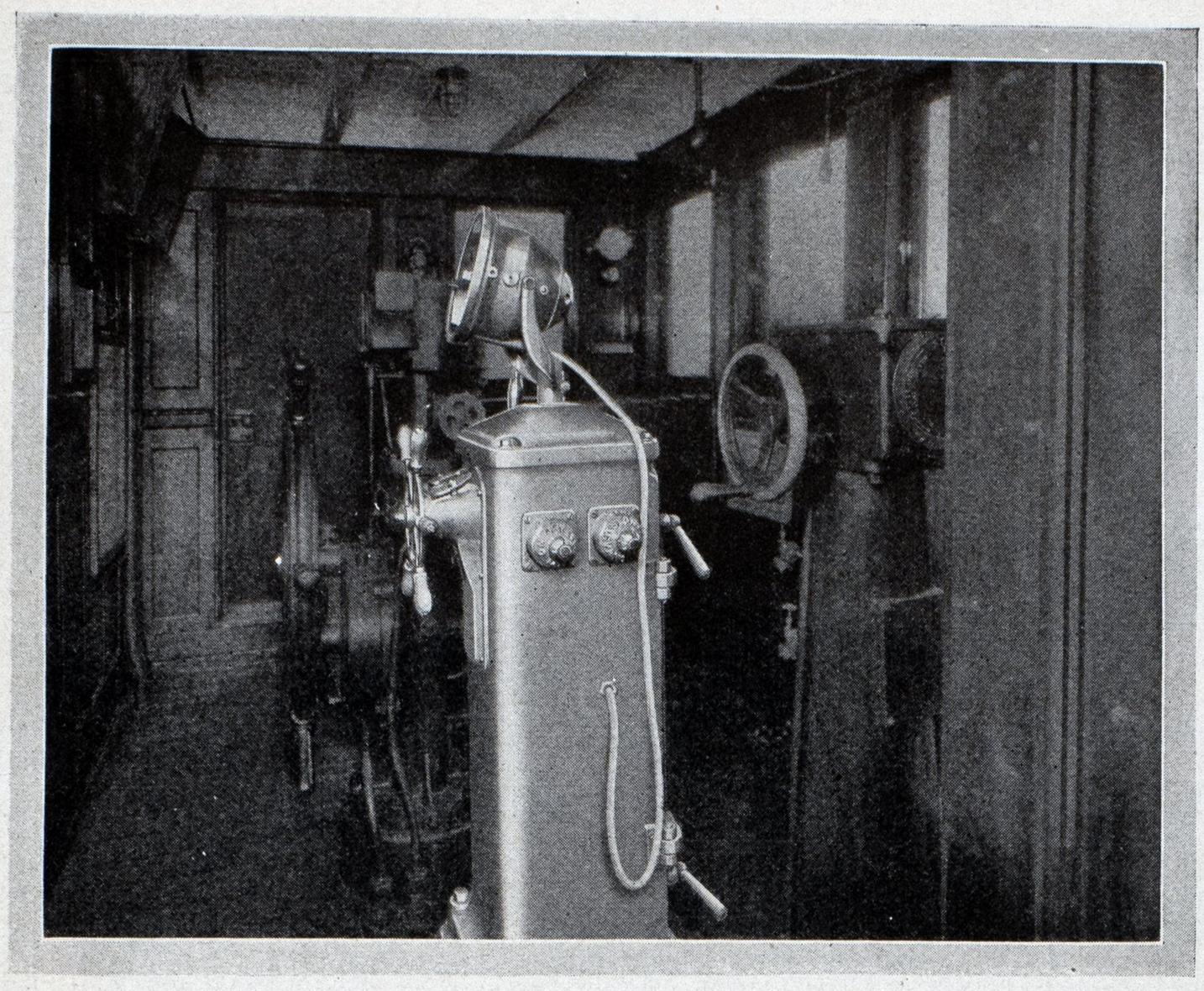
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Wheelhouse of the M/S COURAGEOUS showing the Sperry Gyro-Pilot in the foreground. This Gyro-Pilot provides manual-electric steering, automatic steering or free use of the hydraulic telemotor whenever desired. Three independent means of steering are therefore available on the bridge of the COURAGEOUS.

A degree in time saves *nine*

NEVER was the old adage, "A stitch in time saves nine," any better exemplified than by the Sperry Gyro-Pilot in its ability to steer a ship with such little use of rudder. To check a yaw at its beginning requires only a degree or two of rudder; allow the same yaw to get headway and ten or more degrees of rudder are required to check it.

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The earning power of every ship, new or old, can be increased by the installation of the Sperry Gyro-Pilot.

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The M.S. MUNCOVE, operated by the Munson Line. 4125 d.w.t. Equipped with 4 cycle, 6 cylinder McIntosh and Seymour Diesel Engine, 925 S.H.P. Lubricated since 1923, with TEXACO URSA OIL.

"Everything Going Fine with TEXACO URSA OIL"

Such is the performance record of TEXACO URSA OIL on the Diesel Engine of the "M.S. MUNCOVE".

Since 1923, when we first began lubricating the Diesel Engine of the M.S. Muncove, the owners have never had any trouble due to oil.

Since 1923, the Chief Engineer of the MUNCOVE has invariably reported: "Everything going fine".

Our own Engineer's report, after periodic check-ups on this Diesel's performance, has always been: "Everything going fine".

TEXACO URSA OIL can be depended upon to give satisfaction because it is made especially for Diesel Engine lubrication—and nothing else.

TEXACO URSA OIL burns cleanly.

It will not emulsify.

It maintains compression.

It forms less carbon.

It protects cylinder liners against wear.

How TEXACO URSA OIL *Reduces Cylinder Wear*

A measurement for cylinder liner wear was recently made on the U. S. Engineers Dredge "Mackenzie" which is also lubricated with TEXACO URSA OIL. In measuring the cylinders after a year of service a difference of only one one-thousandth of an inch was found, which is well within the limits of measurement error.

No matter what the make of Diesel—or how severe the service:—"Call up The Texas Company, first!"

Stocks Kept at Ports throughout the World

THE TEXAS COMPANY

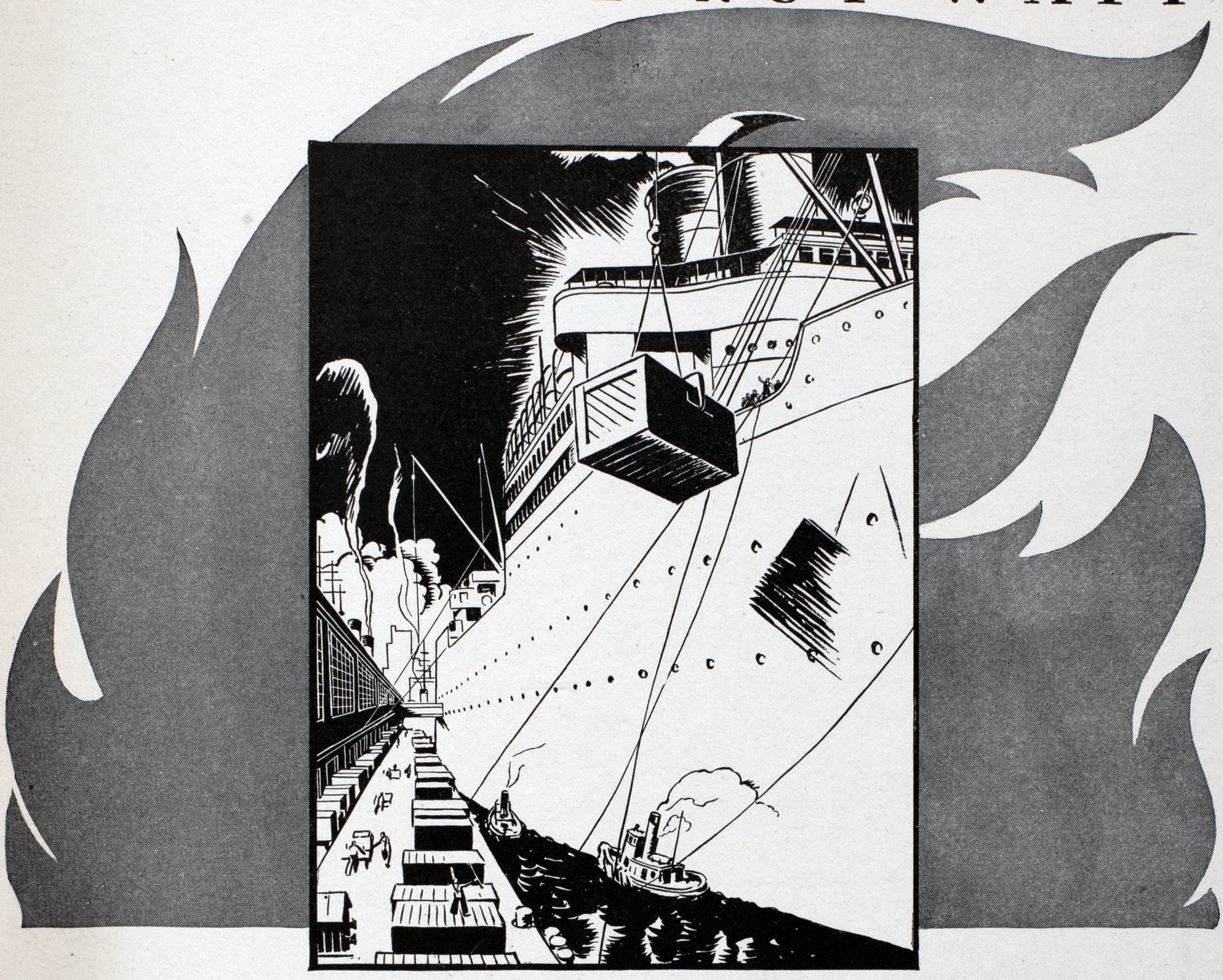
Texaco Petroleum Products

Marine Sales Division

Dept. K1, 17 Battery Place, New York City

OFFICES IN PRINCIPAL CITIES

FIRE WILL NOT WAIT



The cargo's SAFE when ALFITE stands the watch

Here is the simplest system known for extinguishing cargo fires.

It is instantaneous. It is sure. It will not damage the cargo. It is light in weight. It is *not* expensive.

The ALFITE System stores ALFITE (carbon dioxide) gas in cylinders which are connected by fixed piping to each hold.

There are both automatic and manual releases for the very simple discharge valves of the ALFITE System.

There are fewer working parts and all are built to stand up under crucial tests. Cylinders are easily recharged.

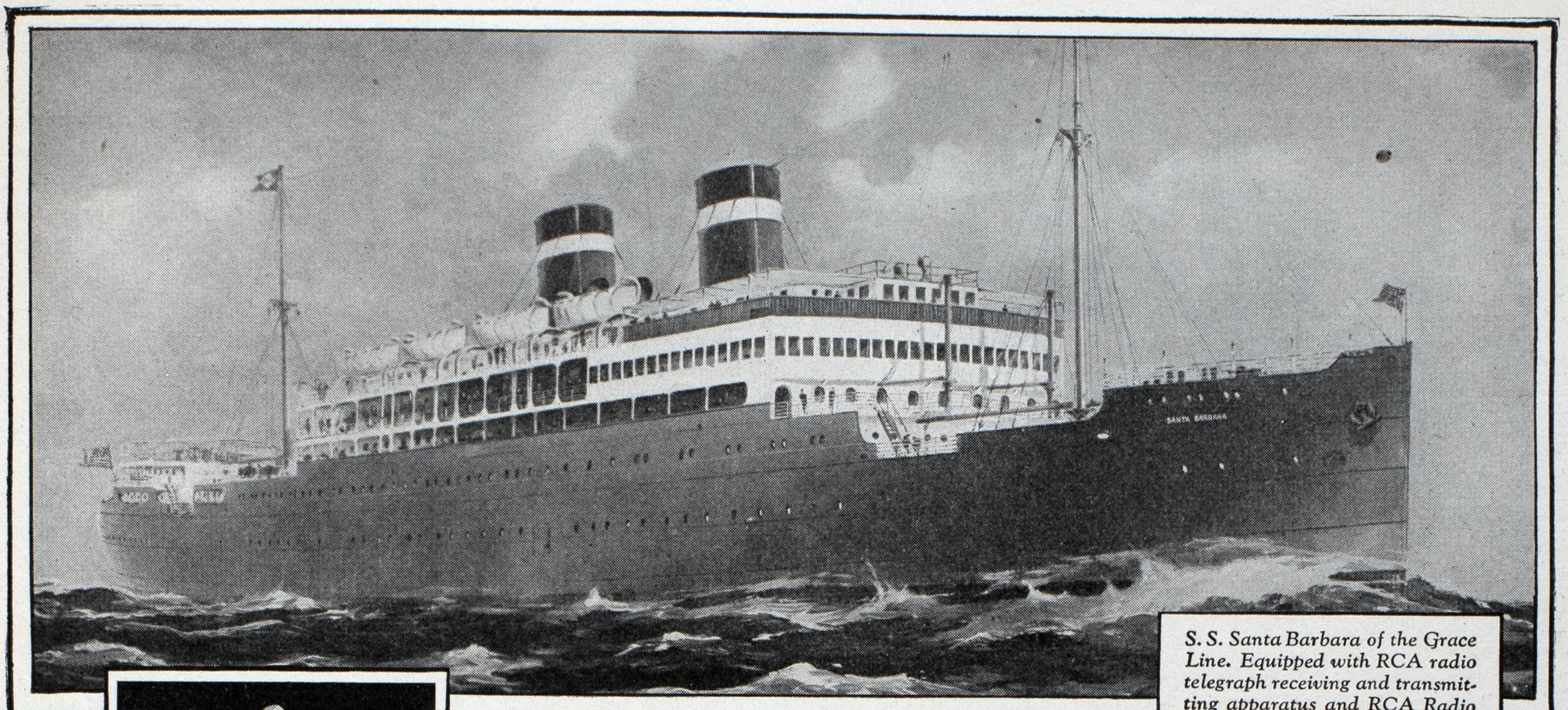
No fire can live in even 17% of this ALFITE gas. It matters not that cargo fires are fought unseen. ALFITE does the job in a matter of seconds—and safely too.

You'll be interested in full details. Write us or call our nearest branch office. American-La France and Foamite Corporation, Engineers and Manufacturers, Dept. J11, Elmira, N.Y.

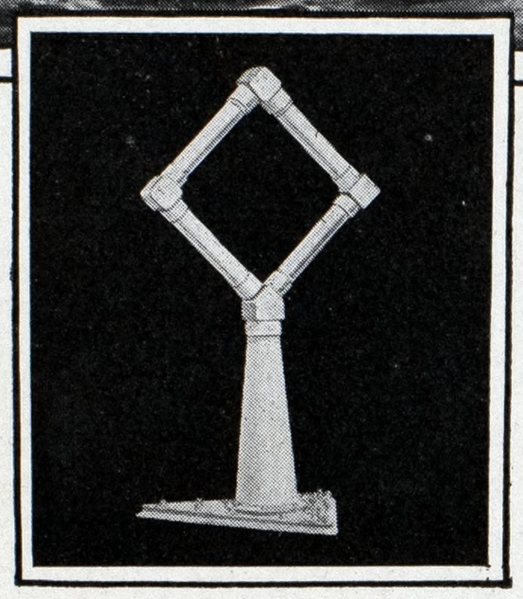
AMERICAN-LA FRANCE AND FOAMITE PROTECTION

A Complete Engineering Service

For Extinguishing Fires



S. S. Santa Barbara of the Grace Line. Equipped with RCA radio telegraph receiving and transmitting apparatus and RCA Radio Direction Finder.



120 steamship companies have equipped with RCA apparatus

More than 800 vessels of 120 steamship companies now carry either transmitters, receivers, or radio direction finders furnished by the Radiomarine Corporation of America.

An additional 500 vessels are receiving RCA service—unsurpassed in efficiency and unequalled in scope.

Complete RCA Service includes:

1. *Equipment*—transmitting and receiving vacuum tube type; radio direction finder.
2. *Service on Equipment*—regular inspections at any of seventeen ports; maintenance of conveniently located stocks of spare parts for repairs and renewals.
3. *Operators*—detailing of experienced operator personnel to the ships.
4. *Coastal Stations*—maintenance of thirteen coastal stations on the Atlantic, Pacific, Gulf and Lakes, for prompt, efficient handling of radio traffic.
5. *Accounting*—checking and settling of accounts.
6. *Licenses*—procuring of all government licenses.

Radiomarine coastal stations are located at the following points:

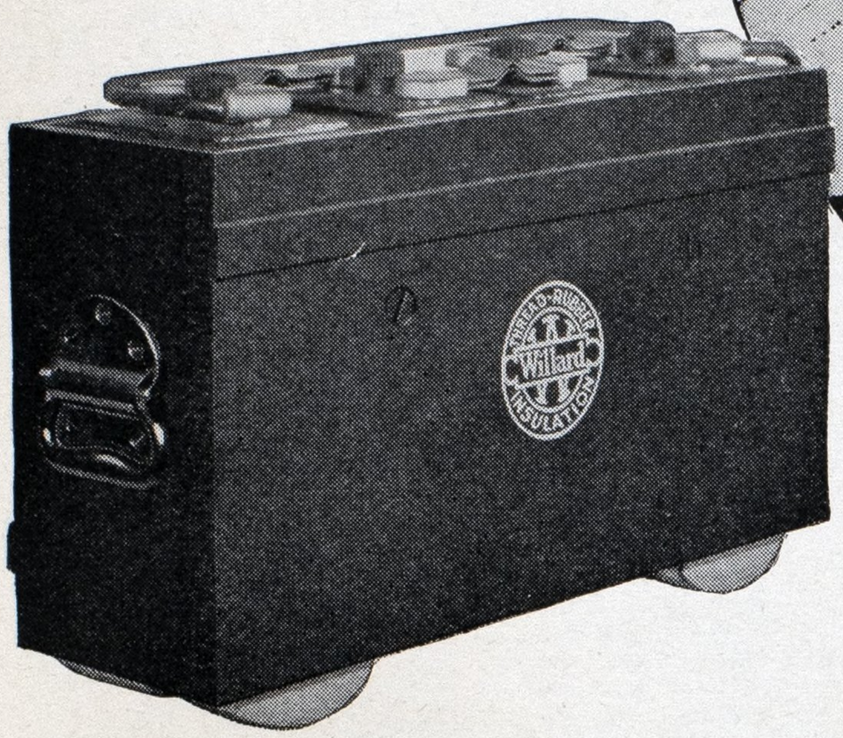
Chatham, Mass.	Galveston, Tex.
New London, Conn.	Los Angeles, Cal.
East Moriches, L. I.	San Francisco, Cal.
New York, N. Y.	Chicago, Ill.
Tuckerton, N. J.	Cleveland, Ohio
Baltimore, Md. (city station)	Buffalo, N. Y.
	Duluth, Minn.

Radiomarine storerooms and service stations in charge of radio men of long experience are located at the following ports:

Boston	Los Angeles
New York	San Francisco
Philadelphia	Seattle
Baltimore	Honolulu
Norfolk	Cleveland
New Orleans	Chicago
Port Arthur	Buffalo
Galveston	Duluth

RADIOMARINE CORPORATION
OF AMERICA
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NEW YORK





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Address Your Nearest Factory Distributor

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For the long cruise, where equipment *must* be reliable, put your trust in Willard Batteries, the batteries made for heavy marine service. You can count on Willards every time — for taking over the full lighting load — for emergency electric current delivered when you want it.

Willard dependability comes from extra-heavy construction of plates and connections. It comes from the Threaded Rubber insulation. It comes from careful manufacture and rigid inspection.

Willard engineers will gladly make battery recommendations for ships in operation or under construction. You can get full co-operation from any of the distributors listed on this page.

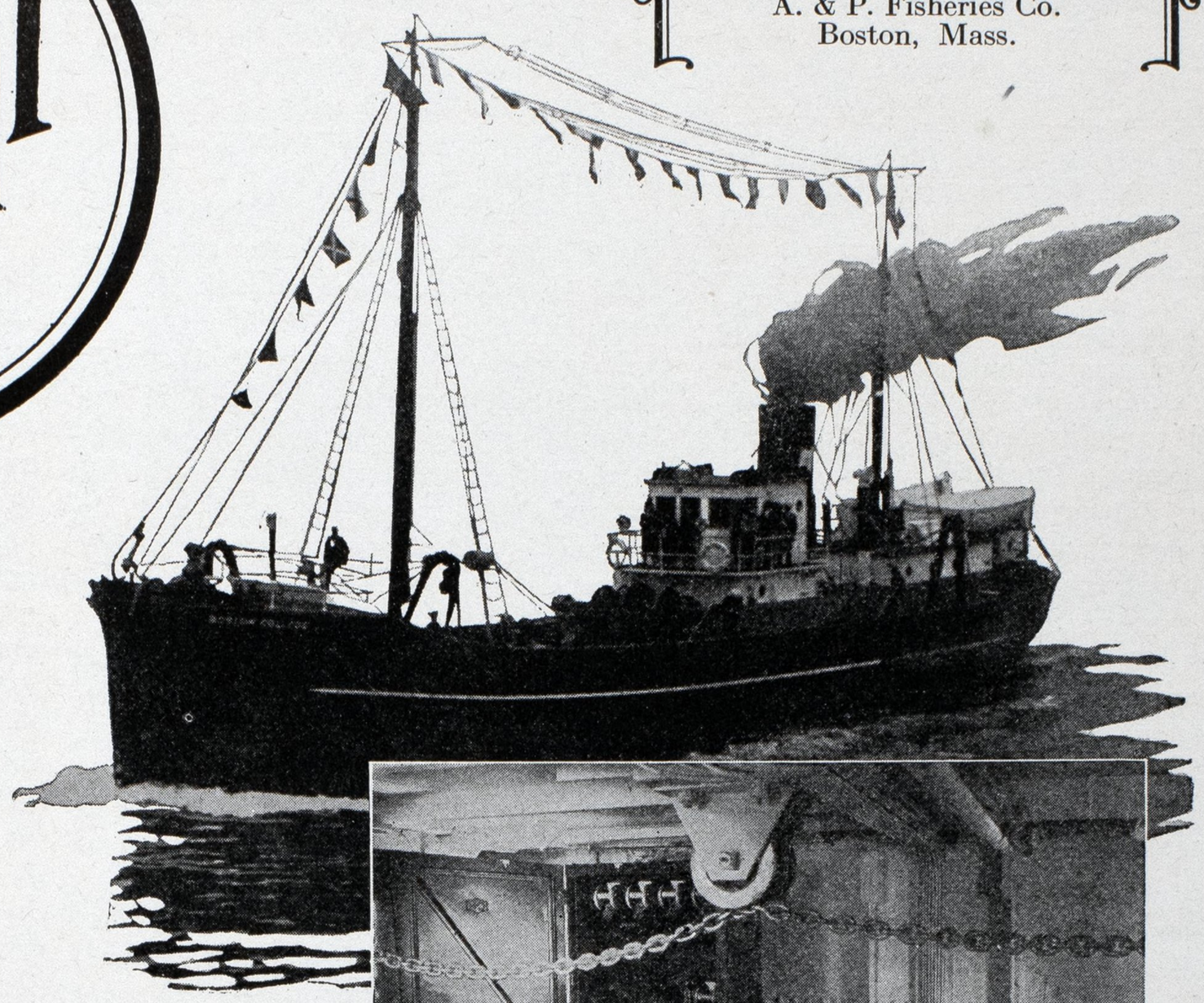
Willard MARINE BATTERIES

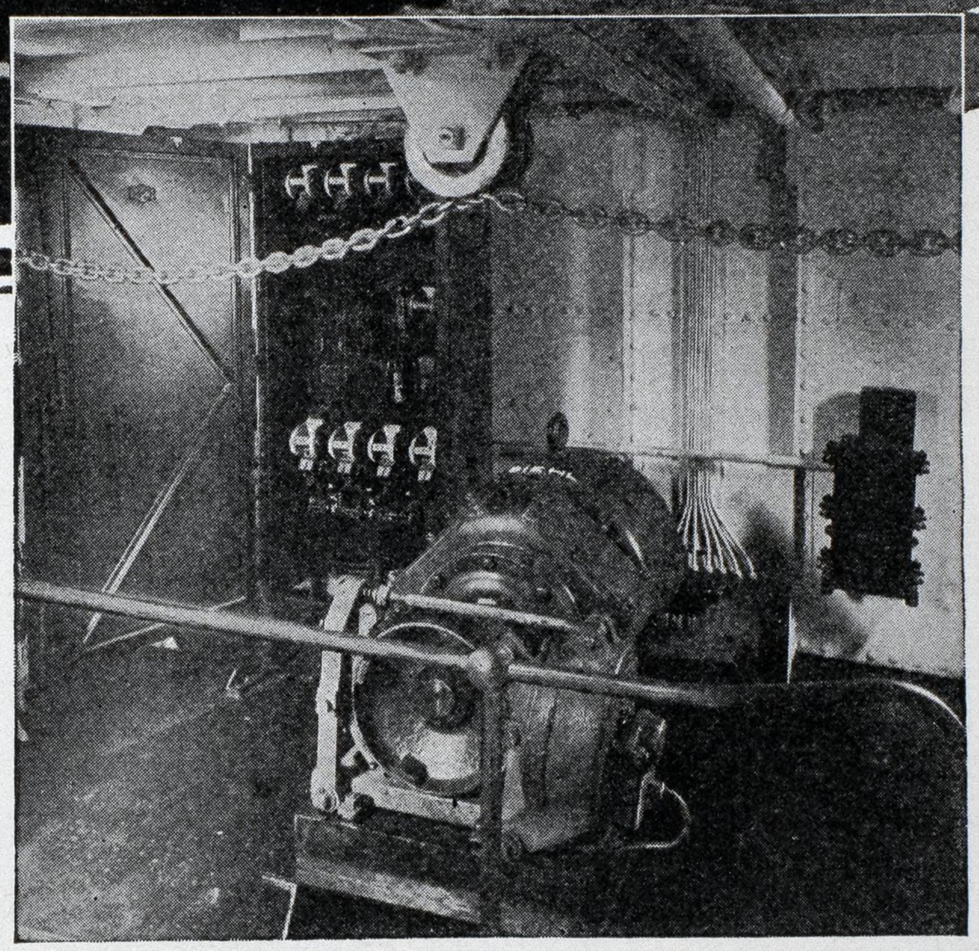
Diehl

Diesel Trawler

BOSTON COLLEGE

A. & P. Fisheries Co.
Boston, Mass.





DIEHL TRAWL WINCH MOTOR
Equipped with Cutler-Hammer Watertight Brake Master Controller and Contactor Panel.

DIEHL Electrical Equipment, designed especially for fishing boats, is of unusually sturdy construction, with particular attention given to the quality and adequacy of insulation, enabling the equipment to withstand the exceptionally severe service to which fishing boats are subjected.

The "BOSTON COLLEGE" is the first of three Diesel engine trawlers using Diehl electrical equipment ordered by the A. & P. Fisheries Company, Boston, Mass., from the Bath Iron Works, Bath, Maine.

The electrical equipment supplied by the Diehl Manufacturing Company includes:

Diehl Type TH, 75 H.P. heavy duty trawl winch motor, capable of delivering 150 H.P. for short periods.

Diehl Type L-16, 10 K.W. drip-proof ball bearing marine generator for connection to auxiliary Diesel engine for lighting, battery charging and pump motor operation.

Diehl small marine type motors.

Cutler-Hammer watertight 14" electric brake; master controller with bevel gear drive extended through bulkhead for operation from the forecastle; enclosed contactor panel for automatic trawl winch control; marine type grid resistance.

DIEHL MANUFACTURING COMPANY

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ELIZABETHPORT, N. J.

BOSTON OFFICE: 566 ATLANTIC AVENUE

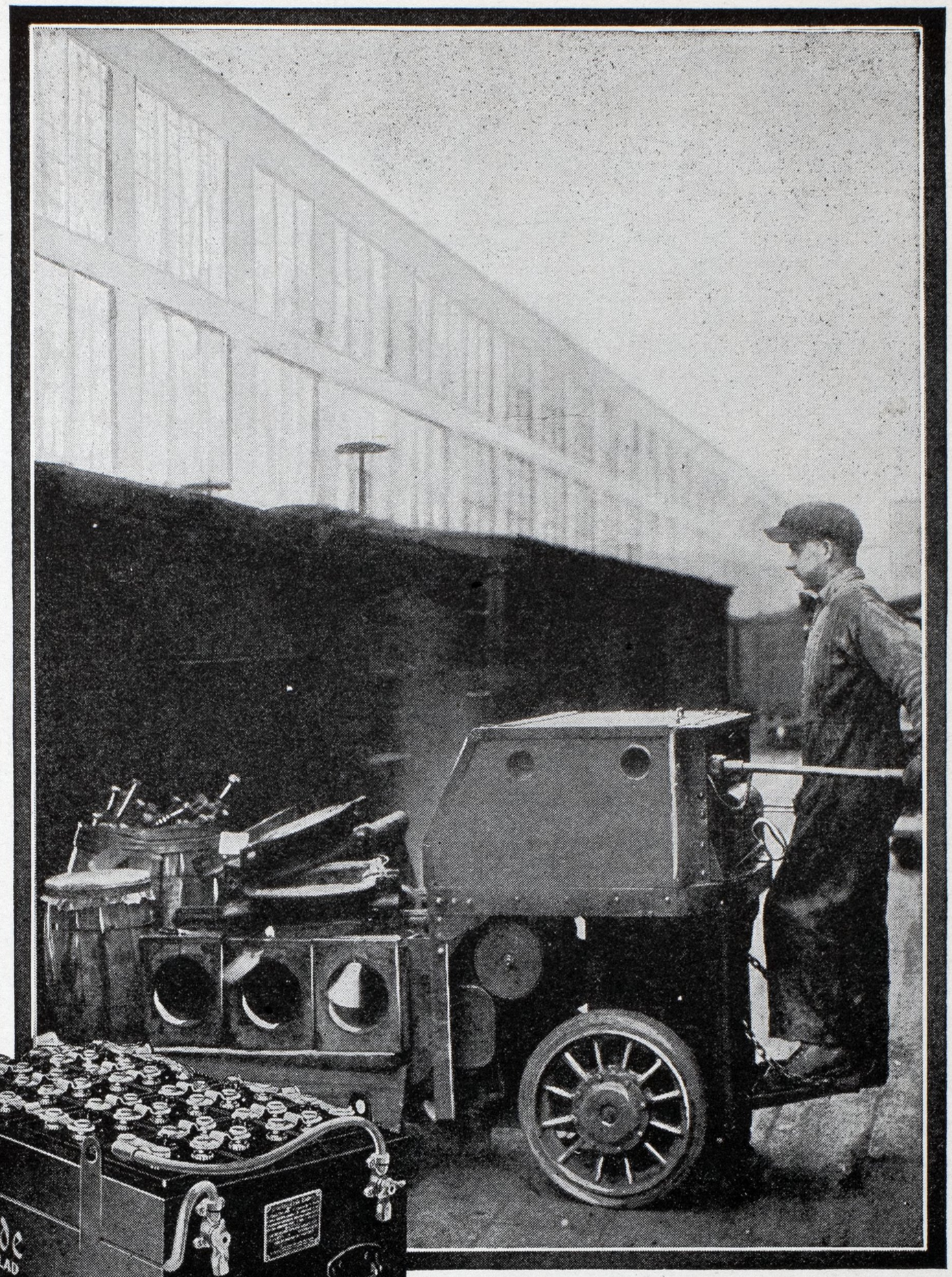
Diehl Marine Electrical Equipment is sold by

BROMFIELD AUXILIARY MANUFACTURING COMPANY — 31 Fish Pier, Boston, Mass.

More material, *handled faster!*

Do it this way!

Read how to keep your electrics on the jump . . . and hauling bigger loads



SUSTAINED speed . . . flexible power . . . industrial electrics *must* have these qualities if they are to meet the demands of modern production.

It is just as important to move material fast at 4:30 P. M. as at 10:00 A. M. And the more they can move at a time the better!

They're doing it, too, in dozens of plants! Manufacturers have found that with Exide-Ironclad Batteries in their industrial electrics, the trucks and tractors can handle more material, faster and at less cost than ever before.

Exide-Ironclad Batteries have day-long speed. They maintain a consistently high voltage, and the speed of the truck depends directly on the voltage of its battery.

Exide-Ironclads have high power ability. They can maintain a steady flow of current for ordinary hauling—or they can deliver a rush of power to climb a ramp or start an extra-heavy load.

These batteries save money at the charging panel, too. They take in current easily, quickly and with little waste.

And you will get this kind of service for years. The special tube construction of its positive plate gives the Exide-Ironclad an unusually long life.

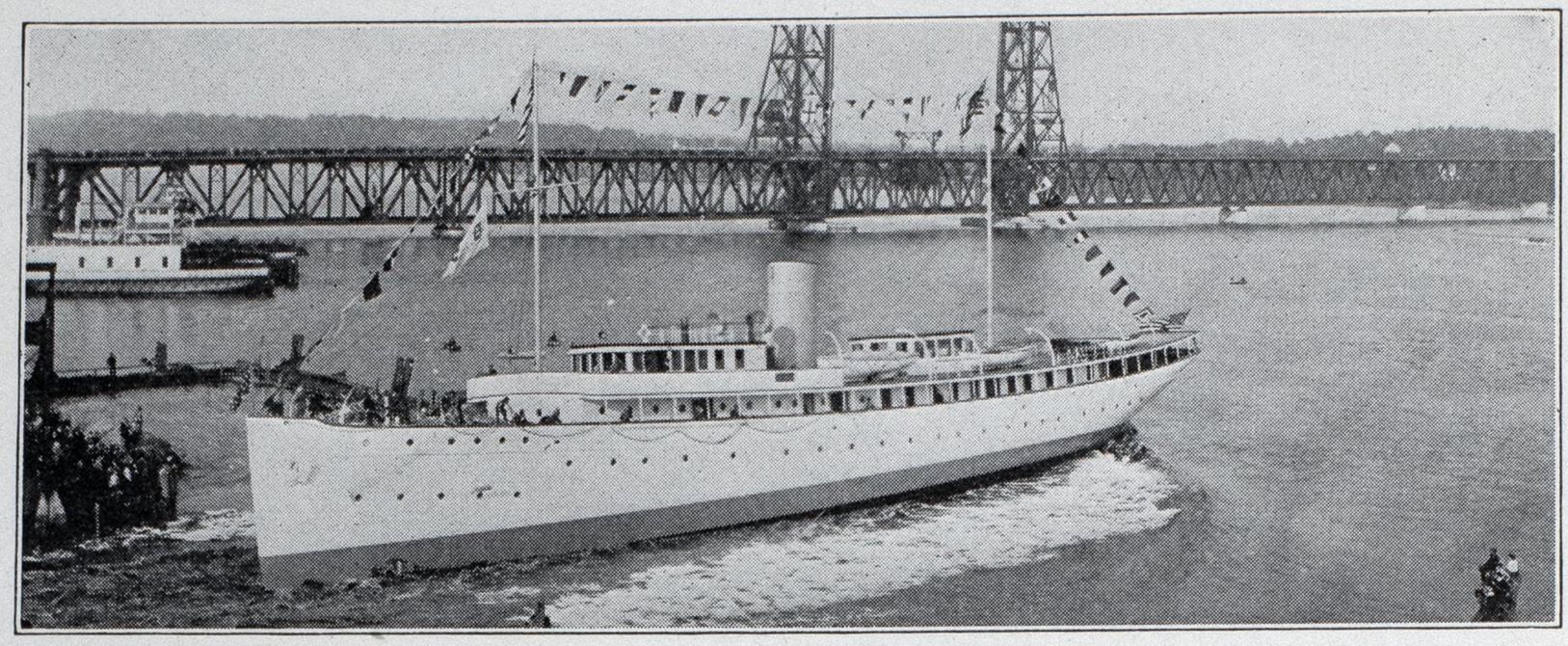
Check these statements with any user of Exide-Ironclad Batteries. He will corroborate them. And he will give you other reasons why these dependable, long-lived batteries are ideal for industrial electric service.

Exide
IRONCLAD
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto

The Finest Yachts Demand the Best Material



SANDUSKY Cast Tail Shaft LINERS

were Specified for the "Wanda" by the builders,

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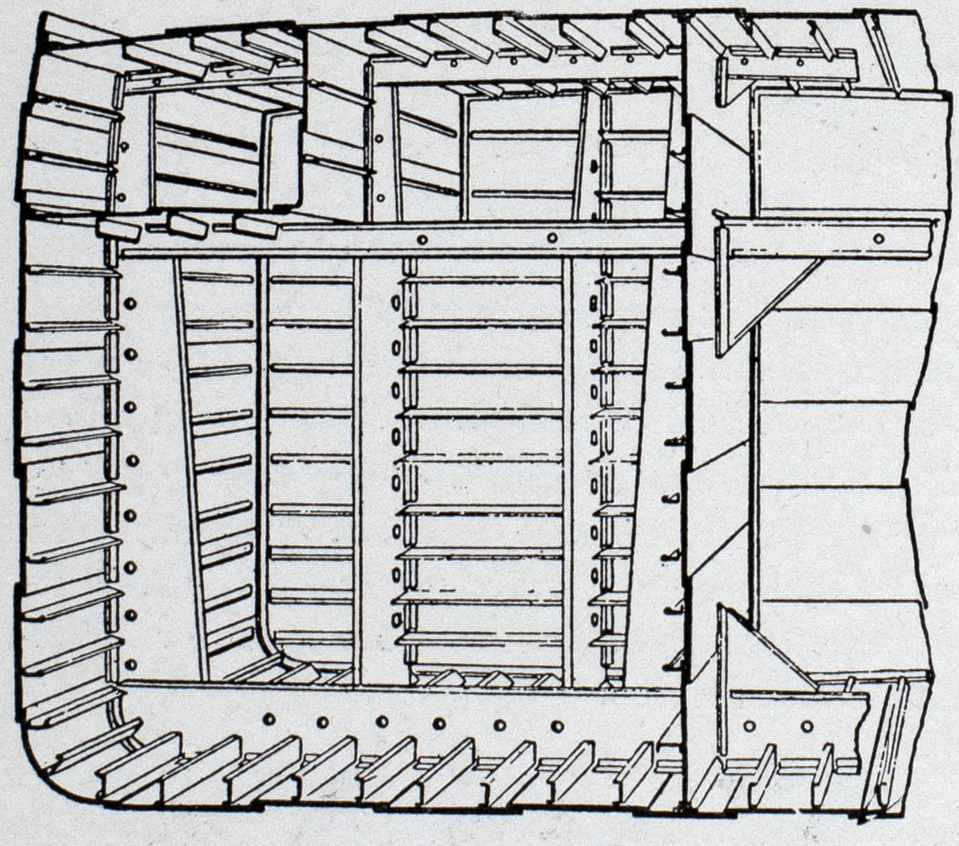
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Progress in Oil-Tank Ship Construction

The "Bracketless-System"

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Eliminates Bulkhead Brackets
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Greatly Simplifies Construction
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1

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MARINE PUMPS

"The Dean of Pumps on Land and Sea"

Single Style & Duplex
Piston Type & Plunger

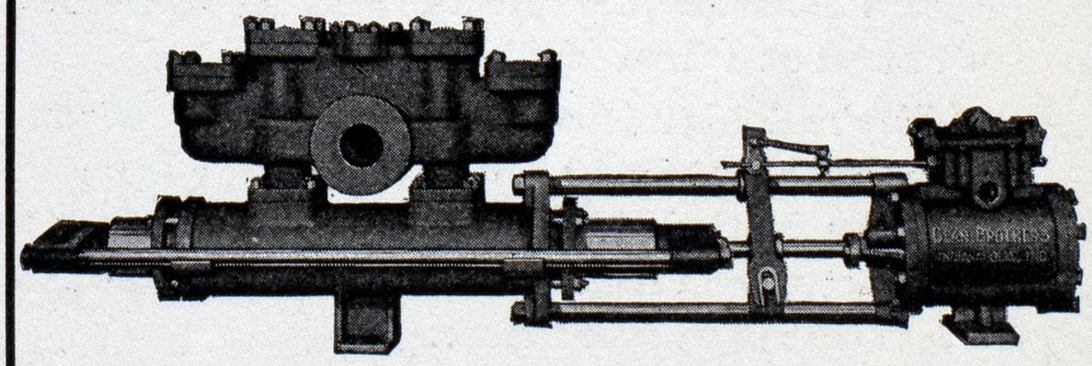


Figure No. 2311 Horizontal Single Style Double Acting Outside End Packed Plunger Trombone Pot Valve Pump For Boiler Feed & Pressure Service.

ESTABLISHED 1869

DEAN BROS. COMPANY

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IN SIX YEARS, only thirty-three 5000-ton and larger motorships, including the twelve conversions by the United States Shipping Board, have been put into service by the owners of the American Merchant Marine.

In the same period and in contrast to this insignificant increase of thirty-three vessels, mostly converted steamers, European owners have had the vision to build over 15 times that number of *new* motorships, mostly of 5000-ton and greater capacity.

The very operators who once before drove the American Merchant Marine off the seas with steamships are now putting their faith, hope and capital into motorships.

Can all these European competitors be wrong—can most of them be wrong—should we get farther behind—or is it time to take a leaf from their book?

McINTOSH & SEYMOUR MOTOR SHIPS

McINTOSH & SEYMOUR CORPORATION

AUBURN, N. Y.



New Chesapeake & Ohio Tug Equipped with ENGBERG Generating Sets—*Another Repeat Order*



TWO previous installations gave the Chesapeake and Ohio Railway dependable, economical operation, with practically no maintenance. Consequently, the ENGBERG 5 Kilowatt Improved Marine Generating Set was again selected, this time for the new steel Tug W. J. HARAHAN, built by The Newport News Shipbuilding and Dry Dock Company.

Continual buying of this kind by the leading marine concerns is definite, substantial proof that ENGBERG Marine Generating Sets are superior equipment and that they will give you first-class service with minimum operating cost.

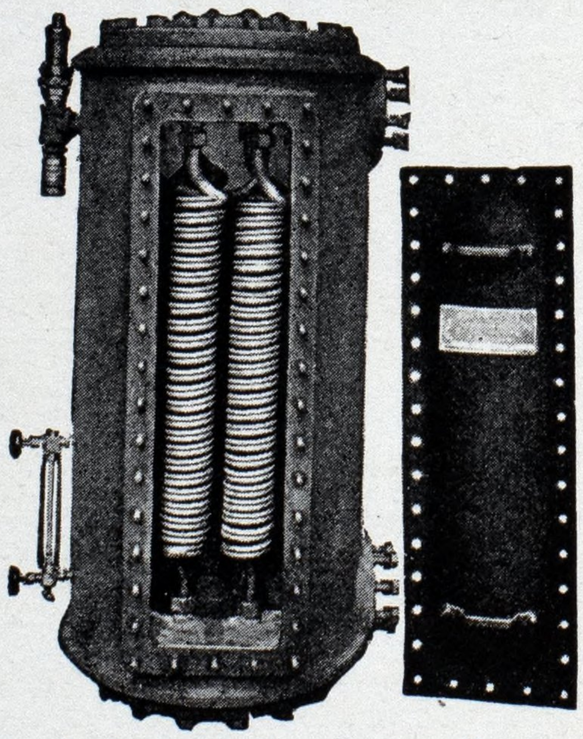
If you contemplate new vessels or Generating Set requirements, we suggest you advise us. Without obligation, our representative will give you complete information. We will gladly send descriptive catalog No. 105.

ENGBERG'S ELECTRIC & MECHANICAL WORKS
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ENGBERG
GUARANTEED OPERATION

ENGINES
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GENERATORS
SWITCHBOARDS
MOTOR GENERATORS
MOTORS

Look into the Reilly Heater

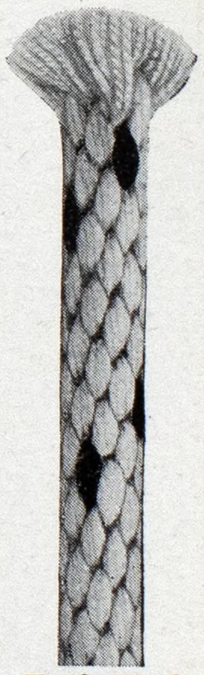


Note how little space it occupies; how easily inspected; how each coil is shaped like a spring, preventing expansion strains on the joint.

There are many other advantages of the Reilly Heater that you will be interested in reading about. Send for bulletin.

The Griscom-Russell Company
285 Madison Ave., New York
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Log Lines



Smooth, tough and durable; no adulterating material to stiffen it and decrease strength and durability. Solid braided of extra quality cotton yarn. Uniform in size and quality. Easily identified by the colored spots, our trade mark.

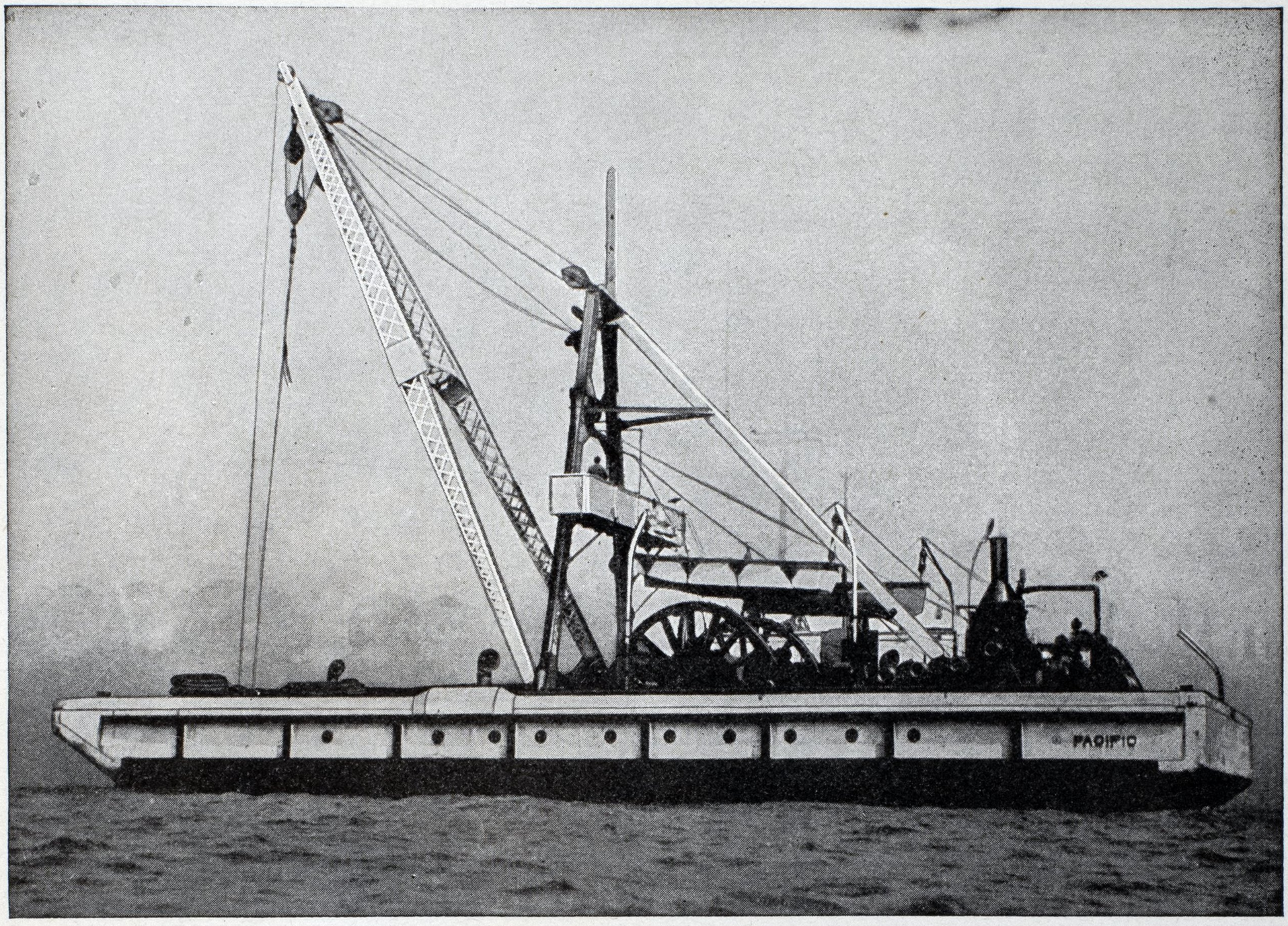
We also manufacture flag halyards, lead lines, tiller rope; solid braided cotton cord in all sizes for various marine uses. Ask for catalog and samples.

Trade Mark Reg. U.S. Pat. Off.



SAMSON CORDAGE WORKS
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ELLIS STEEL HULLS ARE STRONG



Another Great Company adopts Ellis Channel System

Among recent boats built under the Ellis Channel System of Steel Hull Construction is the "Pacific," a $100,000 cable barge for the Pacific Telephone & Telegraph Company. This barge is getting the toughest kind of service in San Francisco and along the western seaboard—laying, maintaining, and repairing submarine and telegraph cable. Its equipment, like the system of construction, is modern in every way. It includes a 25-ton derrick and a 15,000-foot four-inch cable reel, both driven by steam, as well as electric light and electric welding plants. Thirty-five to forty men can live and eat aboard ship.

The Ellis System, due to its low cost maintenance and construction, seaworthiness, and export portability, is the choice of leading owners and builders everywhere. Detailed information on request.

ELLIS CHANNEL SYSTEM

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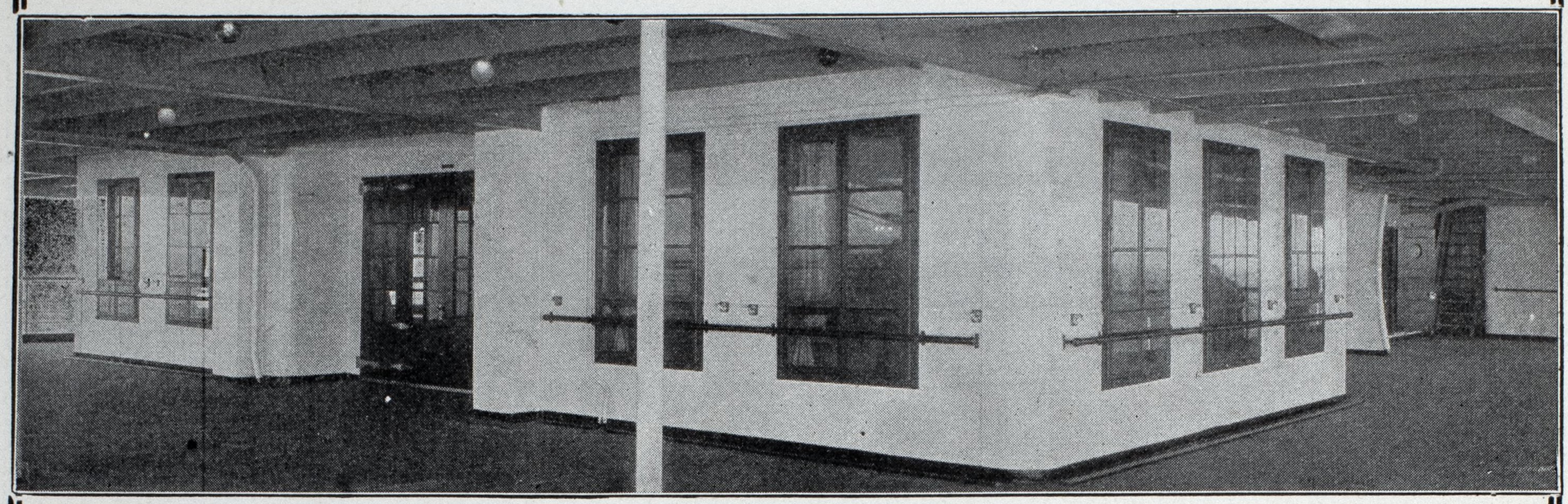
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All the windows in the public rooms and the glass enclosed Promenade Deck on the new Steamships Virginia and California were furnished by

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117 LIBERTY STREET **NEW YORK**

LUBRICATION is probably of more general interest to industry than to any other one subject. Maintenance men, and those who watch maintenance and production costs can take a leaf from the book of experience of thousands of exacting operating men by studying the results of Dixon's Flake Graphite lubrication.

For more than 100 years Dixon's Flake Graphite has been spreading its smooth unctuous veneer over contacting surfaces, reducing friction and wear to a minimum—producing dead smooth bearing surfaces that are so necessary to cool running and long life.

The results of this century of experience in handling pure Flake Graphite and the various greases compounded with graphite are yours for the asking. Send today for Booklet No. C81.

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NATIONAL Diesel Engine Forgings

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THE responsibility of this Organization in construction, repair and conversion work stands preeminent on the coast lines of the United States.

Facilities for the largest or smallest jobs where wide experience and complete equipment bring to owners and operators that Quality of Service so necessary to quick completion are to be found at all or any of the seven Todd yards located at strategic points along the Atlantic, Gulf and Pacific coasts.

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Twenty-Two Floating Docks—Two Graving Docks—Twelve Shipways

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TODD
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The building of this new graving dock is in line with this Organization's policy to have facilities for service that are unsurpassed in the Port of New York.

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Whitlock WATERFLEX Rope should not be confused with the various makes of cordage which are offered as superior to "ordinary" rope. It is obvious that all brands not possessing the patented Whitlock water-resisting feature should be classified as of the ordinary type when contrasted with WATERFLEX, because of the latter's many outstanding advantages.

The fact that WATERFLEX is thoroughly water-resisting, permanently lubricated, easy to handle and splice—*wet or dry*, uniformly flexible under all conditions, and yet costs no more, puts it in a unique and distinctive class.

Through actual performance, discriminating rope buyers have become absolutely convinced that WATERFLEX is unquestionably

The Utmost In Rope Value

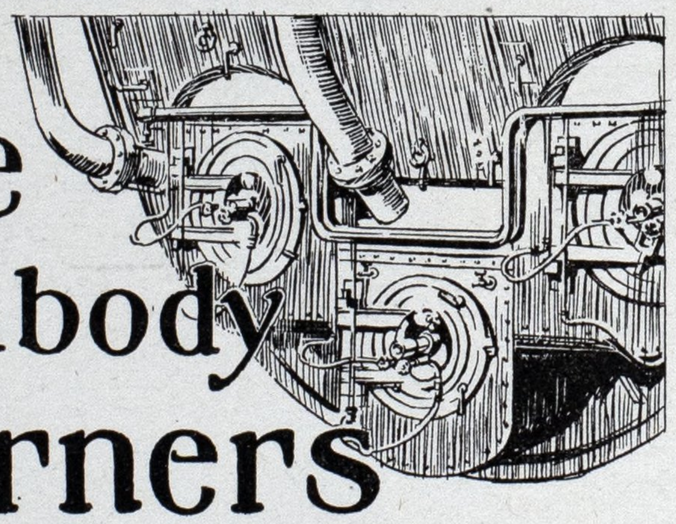
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The Peabody Burners



on the test boiler at the Philadelphia Navy Yard proved that pulverized coal could be burned under Scotch marine boilers—**and the successful trips of the S. S. Mercer have demonstrated that Peabody Burners are practical.**

Ask our Engineers to tell you more about Peabody Pulverized Coal Firing Systems.

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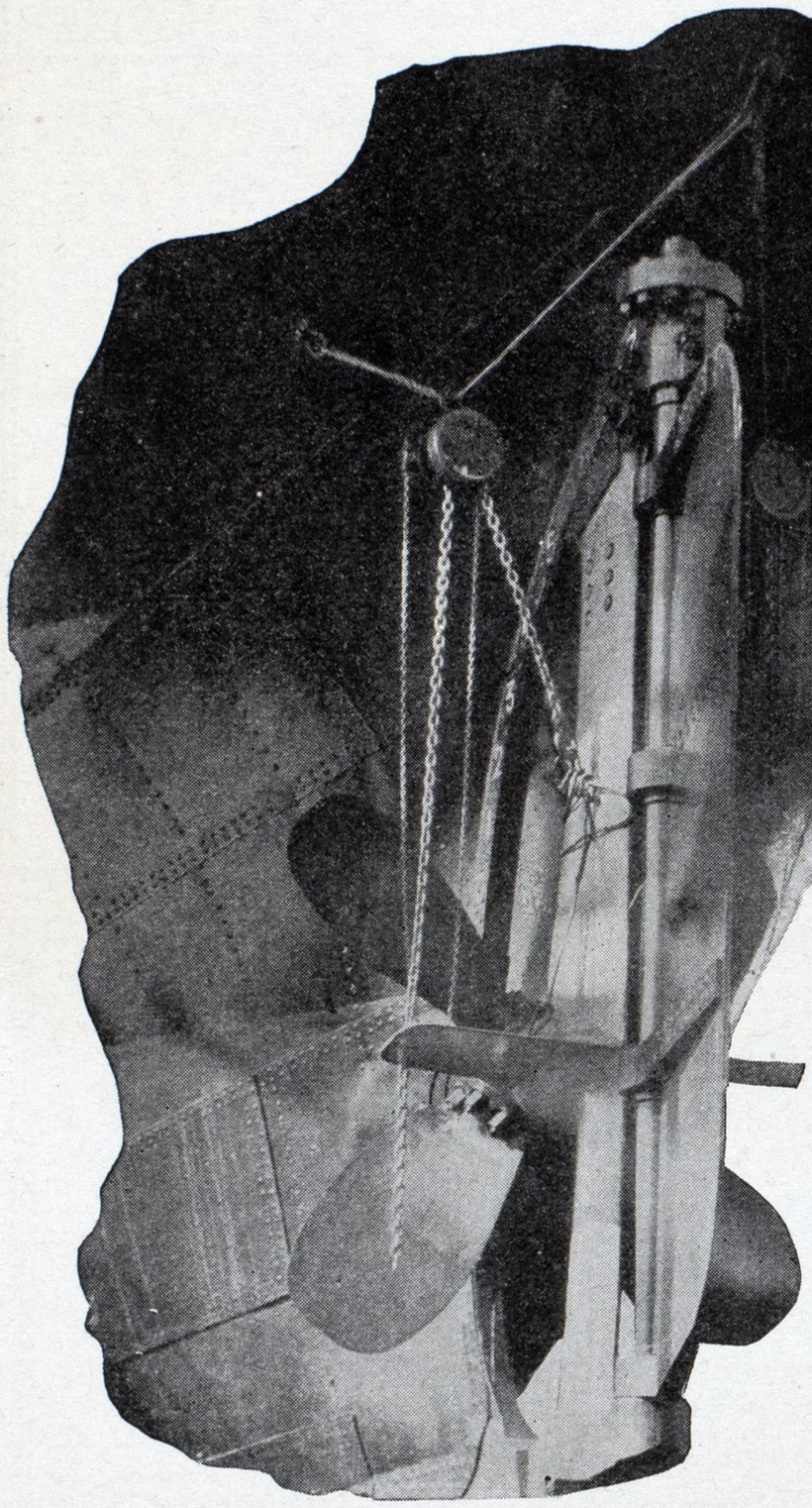
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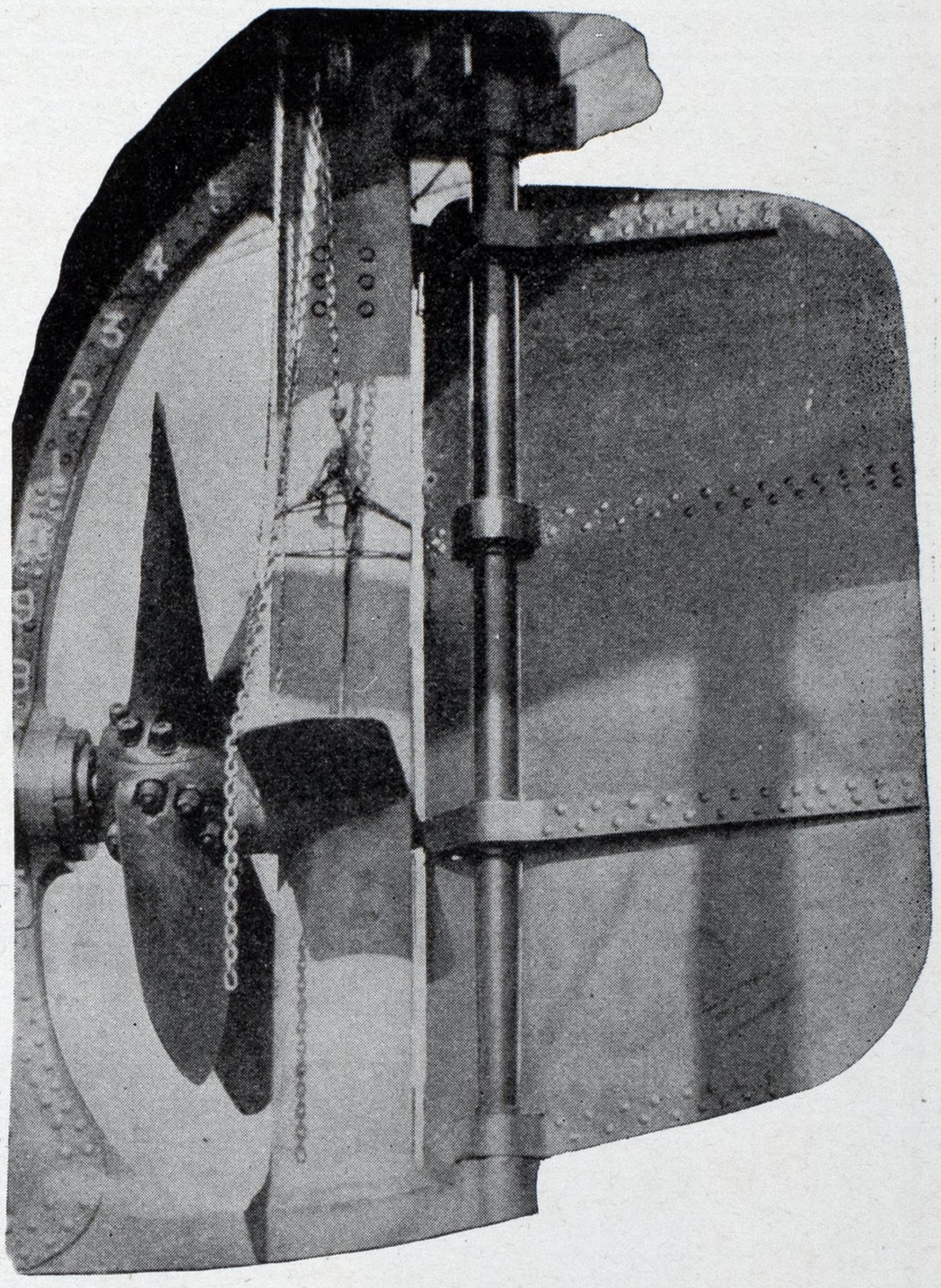
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Collingwood Shipyards Limited

Collingwood, Ontario

Sole Licencees for Canada -- for Star Contrapropellers and Rudders





Photographs show the STAR CONTRAPROPELLER fitted to the steamer "SAND MERCHANT". This installation resulted in a saving in power of 12%. Also, the steering qualities were greatly improved.

STAR CONTRAPROPELLERS have been fitted to 425 vessels representing 2,577,181 tons with an aggregate of 1,035,493 I. H. P.

The main advantages are:

Saving in power of from 10% to 15% for the same speed.
Increase in speed of from 5% to 10% for the same power.
Improved steering, which is important in handling ships in canals and narrow waterways.

Reduction in vibrations.
The Contrapropeller is applicable to all types of vessels.

PLANS AND ESTIMATES WILL BE FURNISHED ON APPLICATION

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Accurate "Non-corrosive" Pressure and Recording Gages, Revolution Counters, Marine Clocks.

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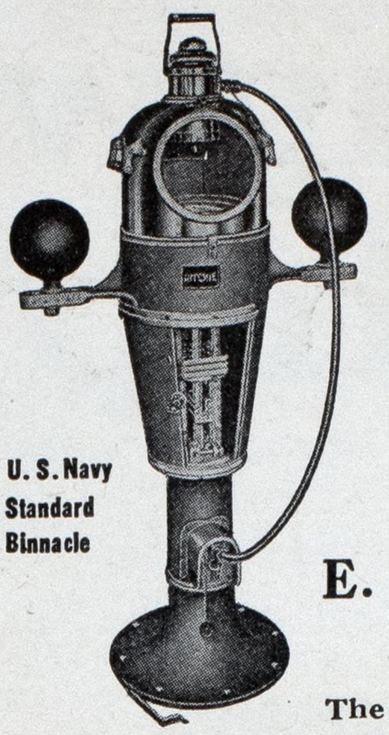
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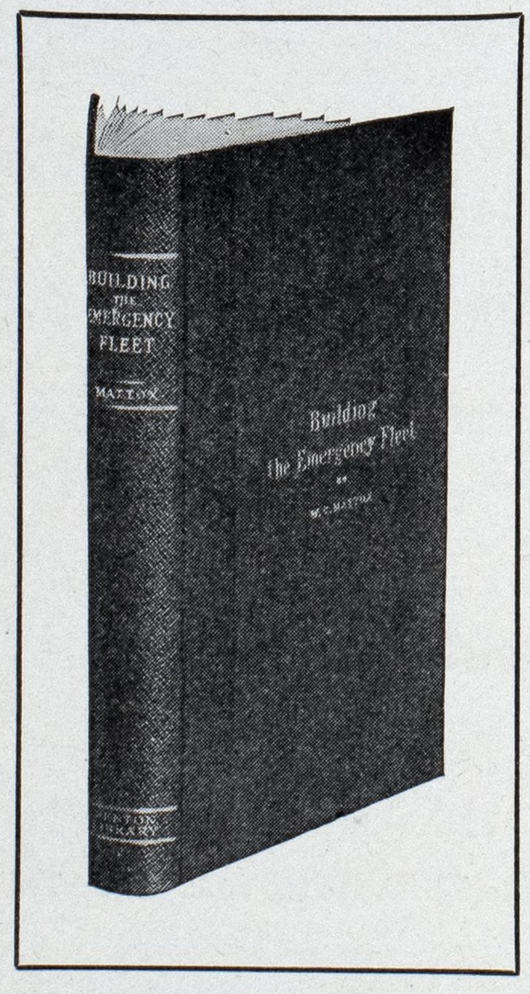
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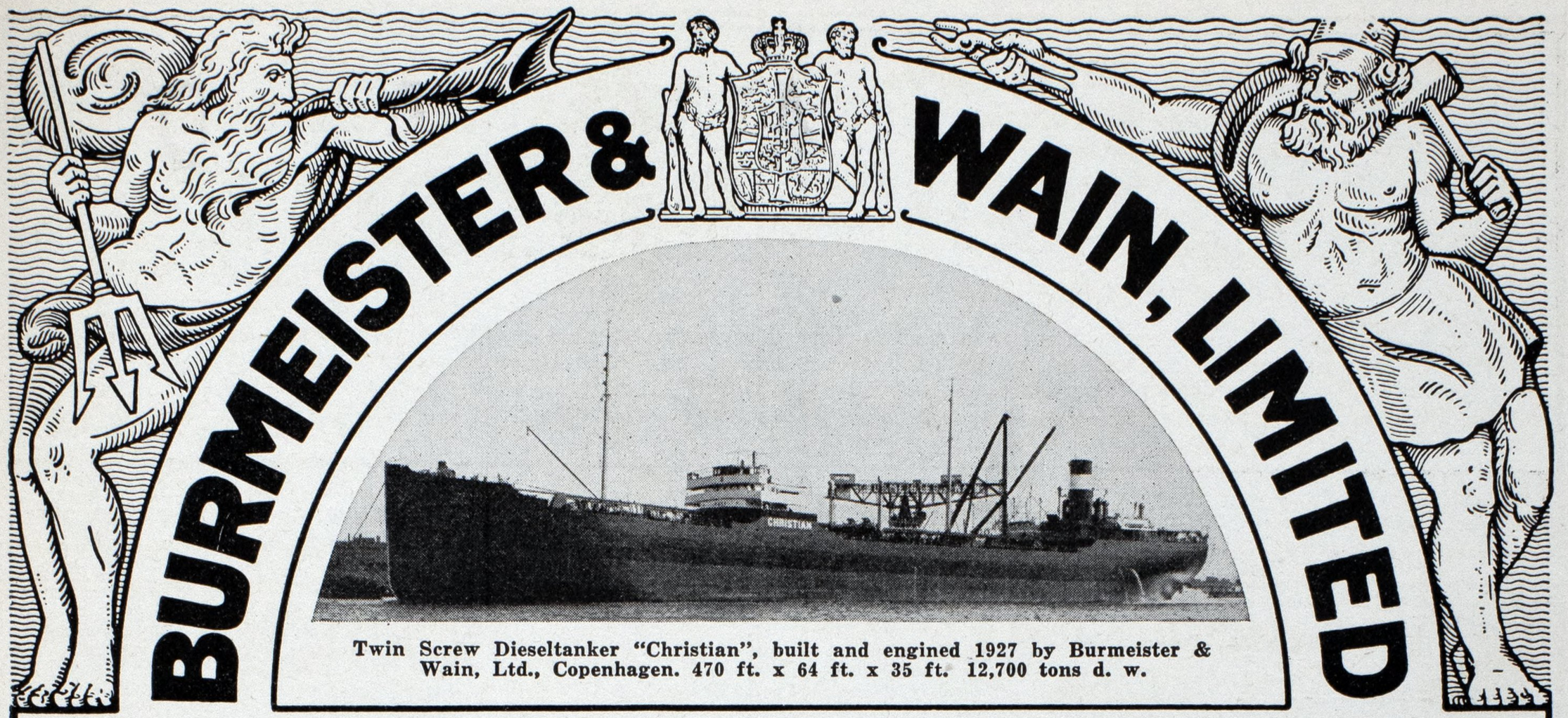
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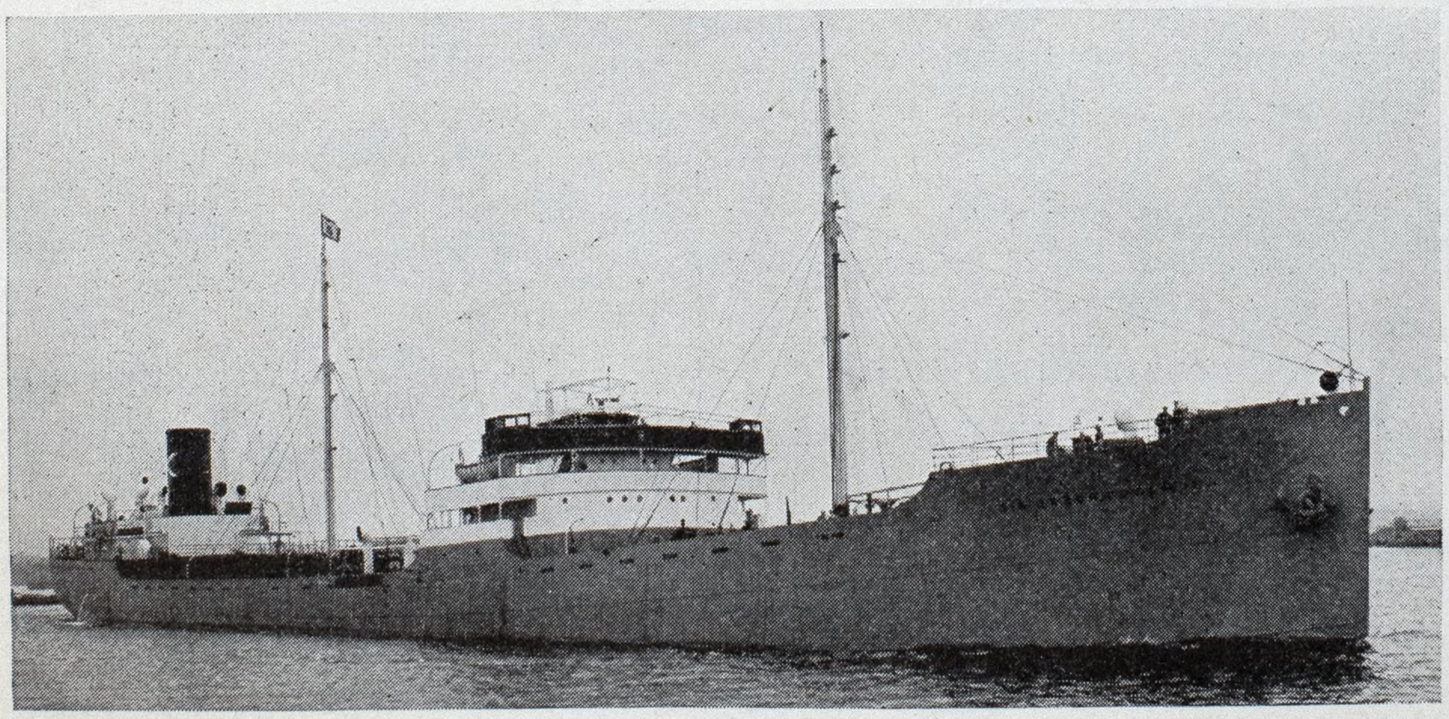
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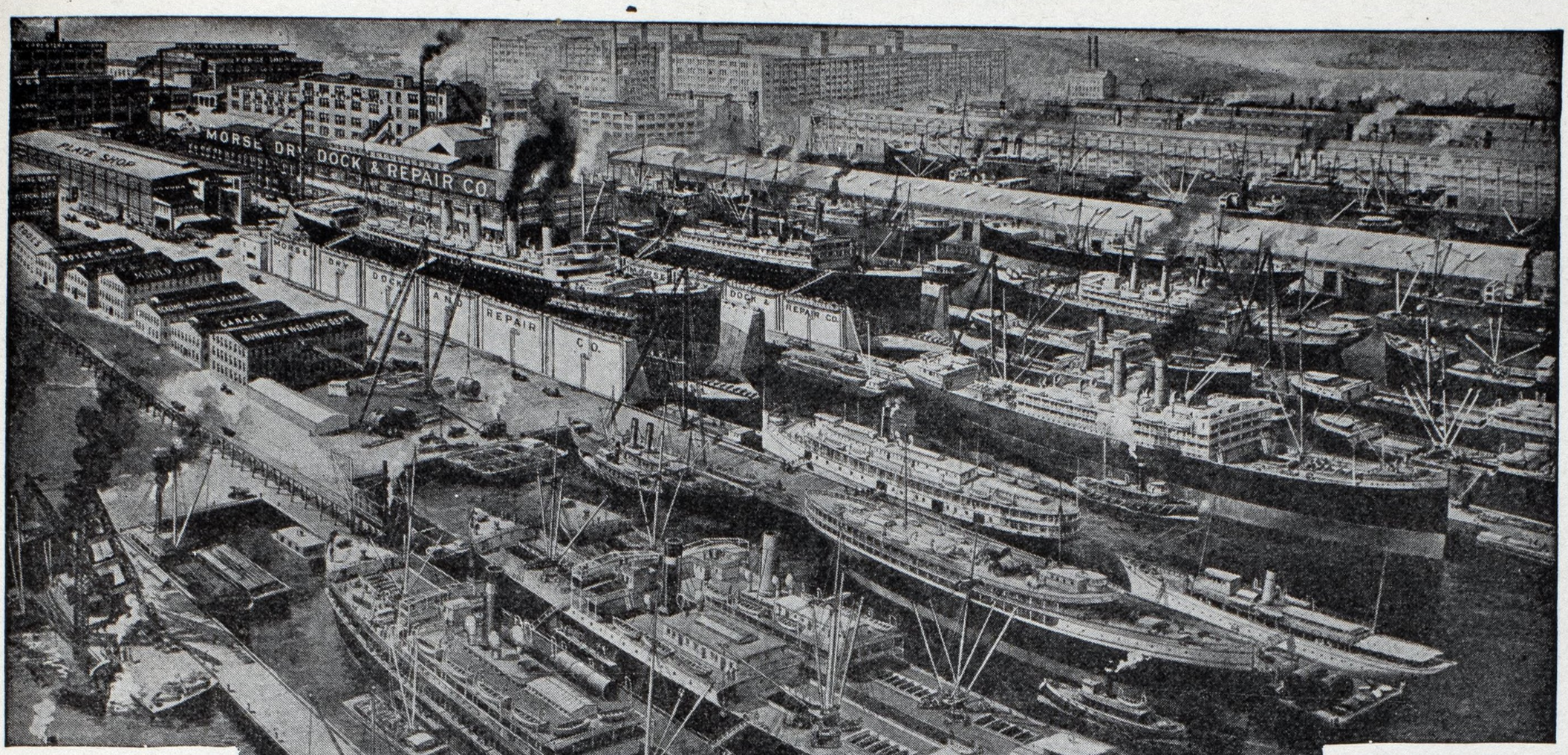
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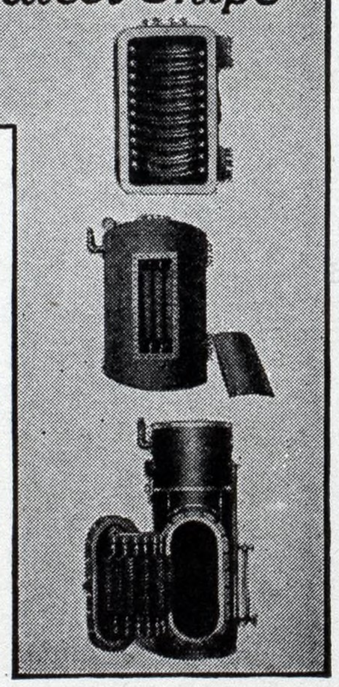
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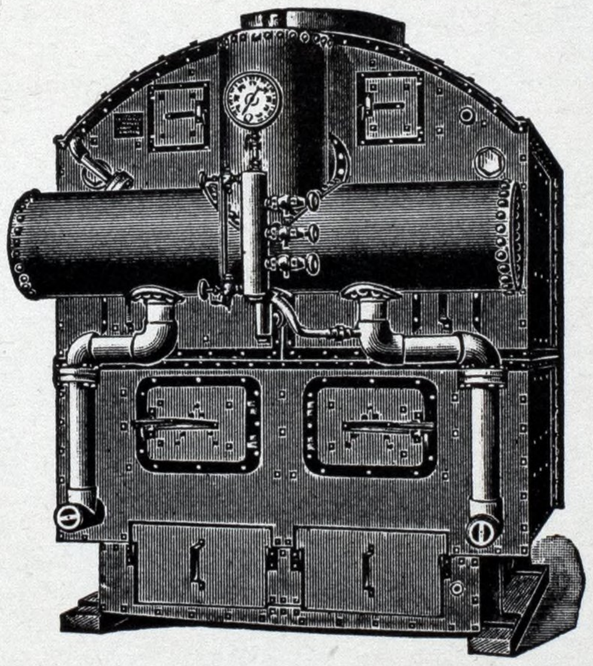


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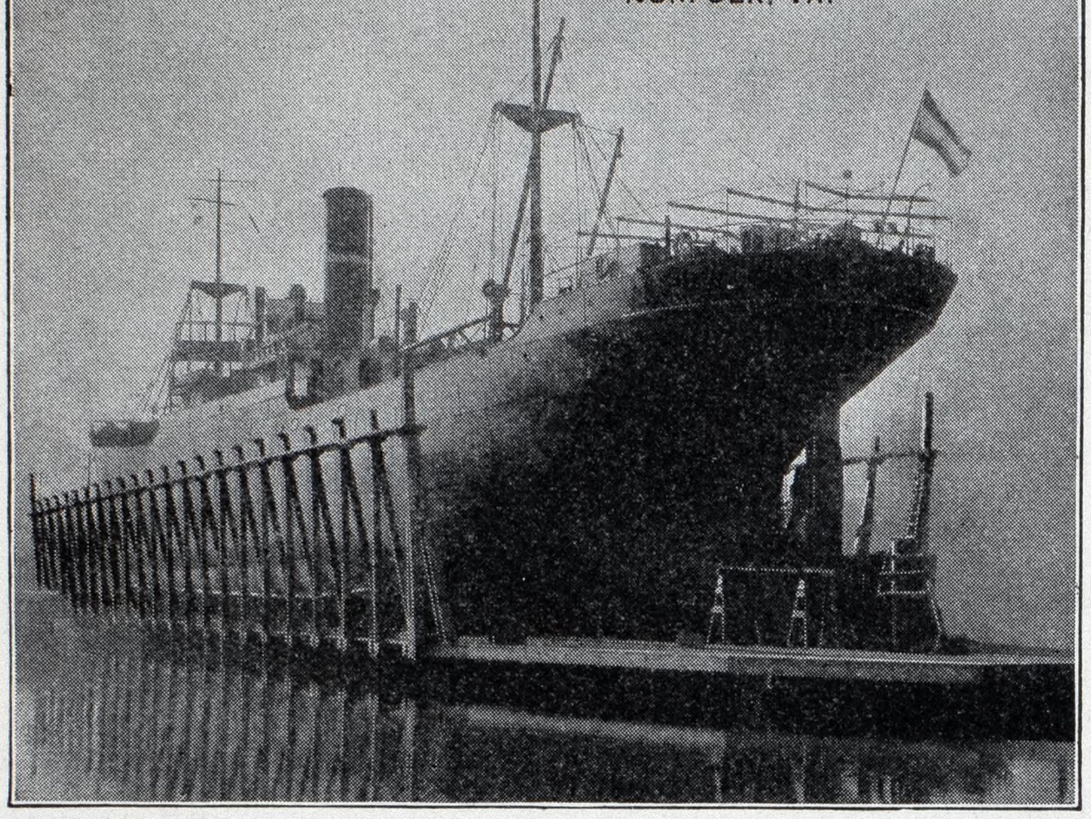
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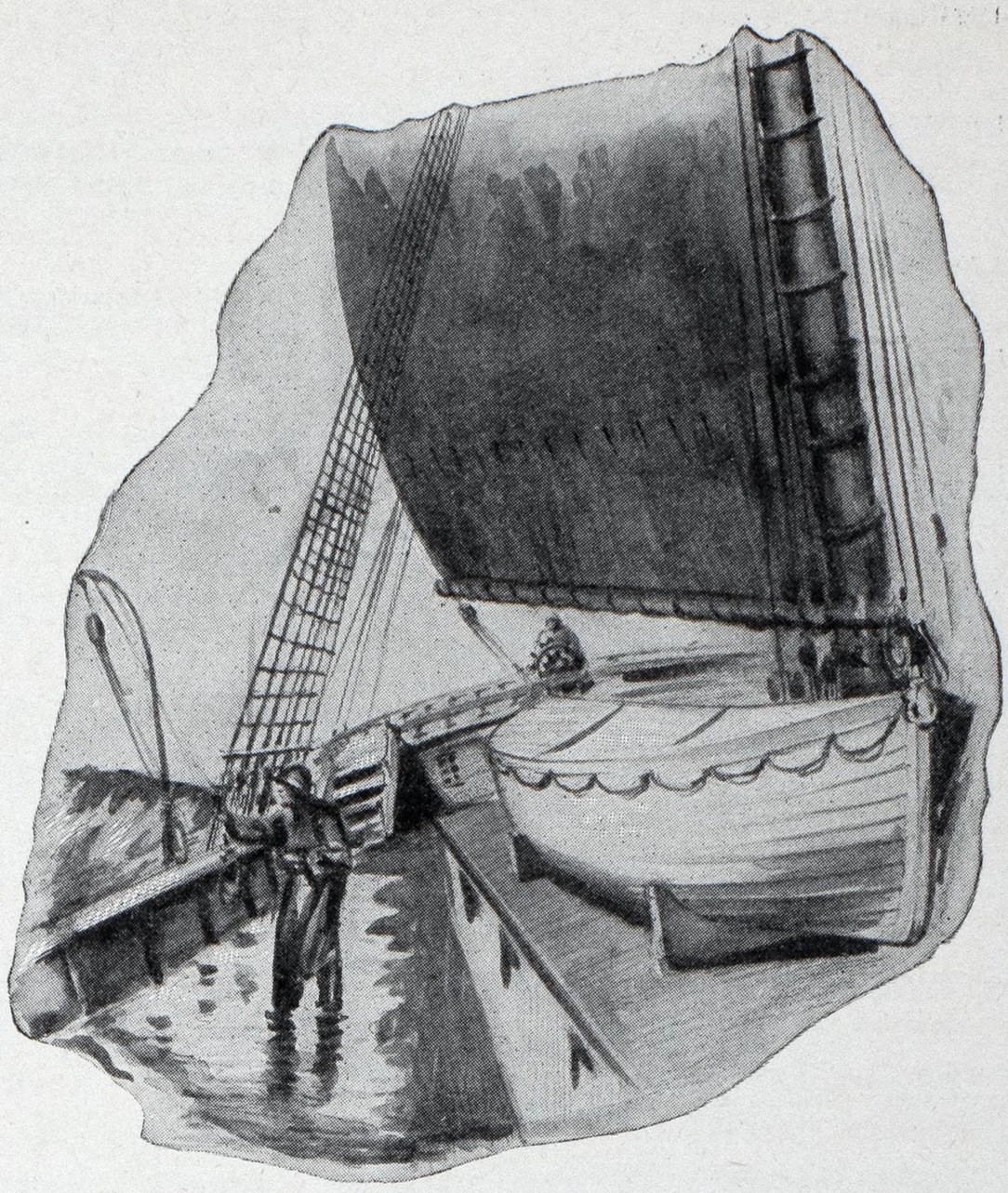
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INSURANCE (Marine)
Boland & Cornelius,
Marine Trust Bldg., Buffalo, N. Y.

INTERNAL COMBUSTION ENGINES
Burmeister & Wain,
Maskin-og Skibsbyggeri, Copenhagen, Denmark

LAMPS (Mazda and Arc)
General Electric Co., Schenectady, N. Y.

LIFEBOATS
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.

LIFESAVING EQUIPMENT
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.

LIGHTING EQUIPMENT
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

LOGS (Patent)
Walker, Thomas, & Son, Ltd.,
58 Oxford St., Birmingham, England.

LUBRICATING OIL
Texas Co., The,
17 Battery Place, New York City.
Vacuum Oil Co.,
61 Broadway, New York City.

MACHINERY (Marine)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Bath Iron Works Corporation, Bath, Maine.
Bessemer Engine Co., Grove City, Pa.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Chicago Shipbuilding Co., So. Chicago, Ill.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.
Toledo Ship Building Co.. Toledo, O.

MACHINISTS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Busch-Sulzer Bros.-Diesel Engine Co.,
2nd & Utah Sts., St. Louis, Mo.
Milwaukee Dry Dock Co., Milwaukee, Wis.
New London Ship & Engine Co.,
11 Pine St., New York City.

MANILA OAKUM—See OAKUM (Marine, Rope, Packings, Plumbers)

MARINE DECKING—See DECKING

MARINE ENGINES
Burmesiter & Wain,
Maskin-og Skibsbygerri, Copenhagen, Denmark

MARINE HARDWARE
Tiebout, W. & J.,
118 Chambers St., New York City.

MARINE RAILWAY BUILDERS
Crandall Engineering Co.,
134 Main St., Cambridge, Mass.

MARINE SUPPLIES
Tiebout, W. & J.,
118 Chambers St., New York City.

MATERIAL HANDLING EQUIPMENT
Smith, Leathem D., Dock Co.,
Sturgeon Bay, Wis.

MOTOR GENERATOR SETS
Diehl Manufacturing Co.,
Elizabethport, N. J.
Engberg's Electric & Mechanical Works,
22 Vine St., St. Joseph, Mich.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

MOTORS (Electric)
Diehl Manufacturing Co.,
Elizabethport, N. J.
Engberg's Electric & Mechanical Works,
22 Vine St., St. Joseph, Mich.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

MOTORS (Winch)
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

NAUTICAL INSTRUMENTS
Ritchie, E. S., & Sons, Brookline, Mass.
Sperry Gyroscope Co., Brooklyn, N. Y.

NITROGEN (Gas)
Linde Air Products Co.,
30 East 42nd St., New York City.

OAKUM (Marine, Rope, Packings, Plumbers)
Stratford, George, Oakum Co.,
165 Cornelison Ave., Jersey City, N. J.

OIL BURNERS
Peabody Engineering Corp.,
110 E. 42nd St., New York City.

OIL BURNING EQUIPMENT
Babcock & Wilcox Co.,
85 Liberty St., New York City.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Coen Co., 50 Church St., New York City.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.

OIL FOR ALL PURPOSES (Marine)
Texas Co., The,
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Vacuum Oil Co.,
61 Broadway, New York City.

OXYGEN (Gas)
Linde Air Products Co.,
30 East 42nd St., New York City.

PACKING (Tarred and Untarred Jute)
Stratford, George, Oakum Co.,
Jersey City, N. J.

PASSENGER SERVICE
Hamburg-American Line,
39 Broadway, New York City.

PIPING (Cold Storage)
Frick Company, Waynesboro, Pa.

PLASTER FIBRE
Stratford, George, Oakum Co.,
Jersey City, N. J.

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Hazel-Atlas Glass Co.,
16th & Market St., Wheeling, W. Va.

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Stratford, George, Oakum Co.,
Jersey City, N. J.

POWDERED COAL BURNERS
Coen Co., 50 Church St., New York City.
Peabody Engineering Corp.,
110 E. 42nd St.. New York City.

PROPELLER BLADES AND HUBS
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLER WHEELS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Detroit Ship Building Co., Detroit, Mich.
Great Lakes Engineering Works,
River Rouge, Mich.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.
Sheriffs Mfg. Co., Milwaukee, Wis.
Toledo Ship Building Co., Toledo, O.
Trout, H. G. Co.,
220 Ohio St., Buffalo, N. Y.

PROPELLERS
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.

PUMPS
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Dean Brothers Co.,
323 W. Tenth St., Indianapolis. Ind.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.
Great Lakes Engineering Works,
River Rouge, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.

PUMPS (Ballast)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Warren Steam Pump Co., Inc., Warren, Mass.

PUMPS (Bilge)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.
Warren Steam Pump Co., Inc., Warren, Mass.

PUMPS (Boiler Feed)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill
Warren Steam Pump Co., Inc., Warren, Mass

PUMPS (Direct Acting)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind

PUMPS (Fuel Oil)
Coen Co., 50 Church St., New York City.

PUMPS (Power)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.

PUMPS (Rotary)

PUMPS (Steam)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.
Warren Steam Pump Co., Inc., Warren, Mass.

PUMPS (Vacuum)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.

PURIFICATION SYSTEMS—See WATER PURIFICATION SYSTEMS

RADIO COMPASS AND DIRECTION FINDER
Radiomarine Corp. of America,
66 Broad St., New York City.

RADIO EQUIPMENT
Radiomarine Corp. of America,
66 Broad St., New York City.

RAFTS
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.

RAILWAY DRY DOCKS
Crandall Engineering Co.,
134 Main St., Cambridge, Mass.

RANGES
Stamford Foundry Co., Stamford, Conn.

REFRIGERATING MACHINERY
Frick Company, Waynesboro, Pa.

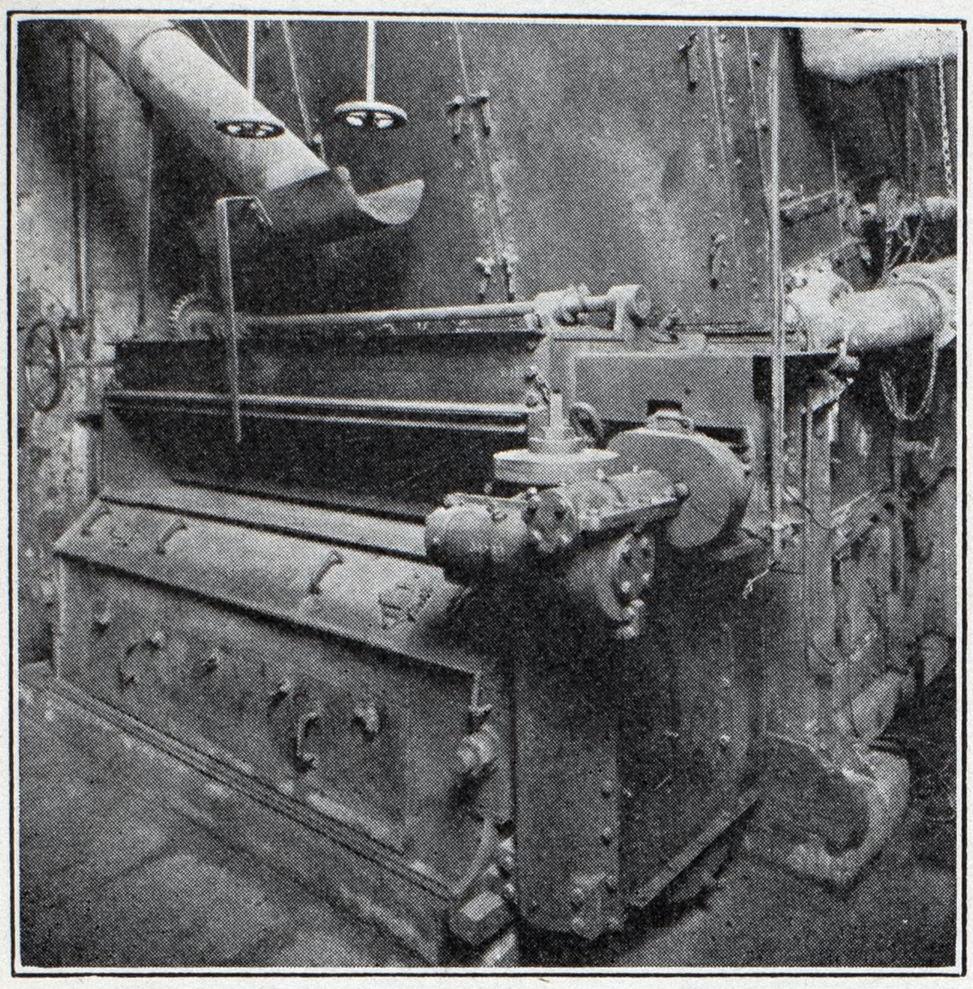
REPAIRS
Maryland Dry Dock Co., Baltimore, Md.

REPAIRS (Electric)
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

REPAIRS (Marine)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Chicago Shipbuilding Co., So. Chicago, Ill.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,
25 Broadway, New York City.
Toledo Ship Building Co., Toledo, O.

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10 to 15 Per Cent Saving in Coal



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When fitted to Babcock & Wilcox marine boilers mean:

At least ten per cent saving in coal over hand firing

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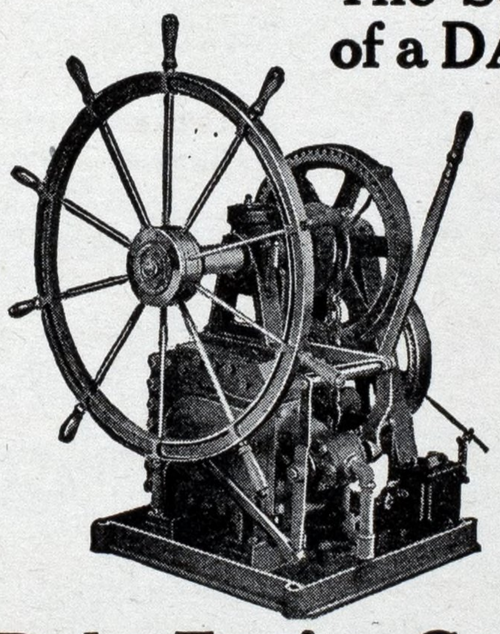
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Collingwood Shipyards, Ltd., Collingwood, Ont., Canada
New London Ship & Engine Co., 11 Pine St., New York City.

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Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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Cummings Machine Works, 255 Atlantic Ave., Boston, Mass.
Sperry Gyroscope Co., Manhattan Bridge Plaza, Brooklyn, N. Y.

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Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston, Mass.
Whitlock Cordage Co., 46 South St.. New York City.

ROPE (Transmission)
Columbian Rope Co., Auburn, N. Y.

ROPE OAKUM
Stratford, George, Oakum Co., Jersey City, N. J.

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Selby Battersby & Co., 810 Noble St., Philadelphia, Pa.

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Texas Co., The, 17 Battery Place, New York City.
Vacuum Oil Co., 61 Broadway, New York City.

SAFETY VALVES (Marine)
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

SCHOONERS (Auxiliary)
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Chicago Shipbuilding Co., So. Chicago, Ill.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Toledo Ship Building Co., Toledo, O.

SEARCHLIGHTS (High Intensity)
Sperry Gyroscope Co., Brooklyn, N. Y.

SEARCHLIGHTS (Incandescent and Arc)
General Electric Co., Schenectady, N. Y.
Sperry Gyroscope Co., Brooklyn, N. Y.

SELF UNLOADING EQUIPMENT
Smith, Leathem D., Dock Co., Sturgeon Bay, Wis.

SEPARATORS (Oil)
Babcock & Wilcox Co., 85 Liberty St., New York City.

SHAFTING COVERING
Paper & Textile Machinery Co., Sandusky, O.

SHIPBUILDERS
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Bath Iron Works Corporation, Bath, Maine.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Collingwood Shipyards, Ltd., Collingwood, Ont., Canada.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Smith, Leathem D., Dock Co., Sturgeon Bay, Wis.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.
Toledo Ship Building Co., Toledo, O.

SHIPBUILDING SYSTEMS
Isherwood, J. W., 17 Battery Place, New York City.

SHIP CONSTRUCTION (Channel System)
Ellis Channel System, Inc., 33 Rector St., New York City.

SHIP LOGS
Walker, Thomas, & Son, Ltd. 58 Oxford St., Birmingham, England.

SHIP REPAIR (Marine)
Collingwood Shipyards, Ltd., Collingwood, Ont., Canada.

SHIP REPAIRS
Bath Iron Works Corporation, Bath, Maine.
Morse Dry Dock & Repair Co., Foot of 56th St., Brooklyn, N. Y.

SHIP STABILIZERS
Sperry Gyroscope Co., Brooklyn, N. Y.

SLEEVES (Rubber)
Paper & Textile Machinery Co., Sandusky, O.

SPUN OAKUM
Stratford, George, Oakum Co., Jersey City, N. J.

STEAMSHIP LINES (Passenger and Freight)
Hamburg-American Line, 39 Broadway, New York City.

STEAM GAGES
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

STEAM TRAPS
Davis Engineering Co., 90 West St., New York City.

STEEL BARGES—See BARGES (Steel)

STEERING ENGINES
Hyde Windlass Co., Bath, Me.

STEERING ENGINES (Electric)
Benson Electric Co., Superior, Wis.

STEERING GEARS
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.

STEERING GEARS (Electric)
Benson Electric Co., Superior, Wis.

STEERING MOTOR (Electric)
Benson Electric Co., Superior, Wis.

STORAGE BATTERIES—See BATTERIES

STOVES
Stamford Foundry Co., Stamford, Conn.

STRAINERS (Oil)
Coen Co., 50 Church St., New York City.

SWITCHBOARDS
Engberg's Electric & Mechanical Works, 22 Vine St., St. Joseph, Mich.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TELEMOTORS
Benson Electric Co., Superior, Wis.
Hyde Windlass Co., Bath, Me.

TORSION METERS
Cummings Machine Works, 255 Atlantic Ave., Boston, Mass.

TOWING LINES
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co., 46 South St., New York City.

TRANSMISSION (Rope)—See ROPE (Transmission)

TRIMMERS
Benson Electric Co., Superior, Wis.

TUBES (Boiler, Stay, Yarrow)
Keating, E. F., Co., 446 Water St., New York City.

TURBINES (Electric)
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

TURBINES (Marine)
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

TURBINES (Steam)
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

TWINE AND ROPE
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston, Mass.
Whitlock Cordage Co., 46 South St., New York City

VALVES AND FITTINGS
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.

VENTILATING EQUIPMENT
Diehl Manufacturing Co., Elizabethport, N. J.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

WASTE (Cotton Wiping, White and Colored)
Stratford, Geo., Oakum Co., Jersey City, N. J.

WATER PURIFICATION SYSTEMS
Griscom-Russell Co., 285 Madison Ave., New York City.

WELDERS (Electric Arc)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

WELDING AND CUTTING GAS
Prest-O-Lite Co., Inc., 30 East 42nd St., New York City.

WHISTLES
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

WHISTLES (Electric)
Benson Electric Co., Superior, Wis.

WINCHES
Benson Electric Co., Superior, Wis.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINCHES (Electric)
Benson Electric Co., Superior, Wis.

WINDLASSES
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINDOWS (Balanced Frameless)
Kearfott Engineering Co. Inc., 117 Liberty St., Ne wYork City.

WIRELESS MESSAGE SERVICE
Radiomarine Corp. of America, 66 Broad St., New York City

WIRELESS SETS AND APPARATUS
Radiomarine Corp. of America, 66 Broad St., New York City.

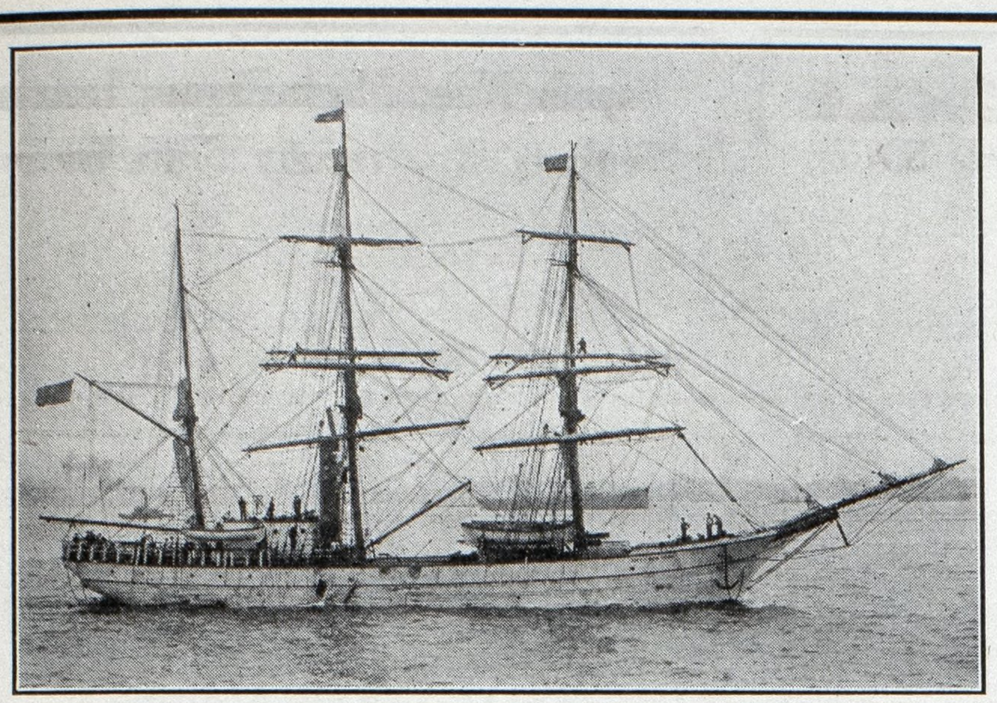
WORKBOATS
Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y.

YACHTS (Sail, Steam and Diesel)
Bath Iron Works Corporation, Bath, Maine.

ZINC (Plates Rolled)
Hazel-Atlas Glass Co., 16th & Market St., Wheeling, W. Va.

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Hazel-Atlas Glass Co., 16th & Market St.. Wheeling W. Va.

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Immediate Shipment from New York Stock
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221 High Street BOSTON, MASS.
Established 1837

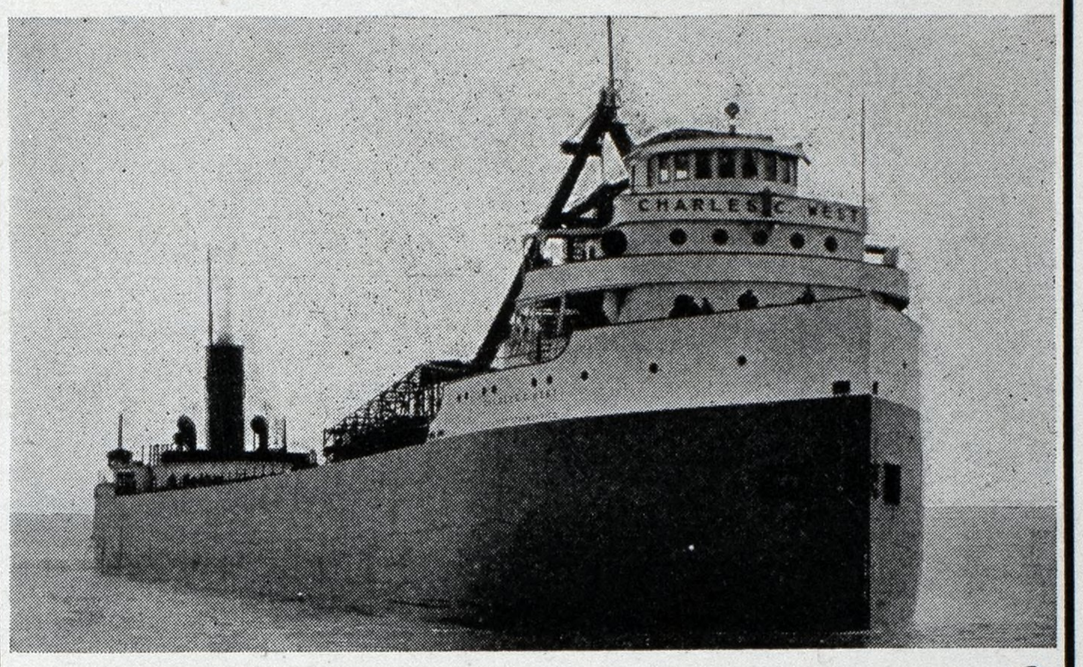
Diving Apparatus and Submarine Armor
Fire Department Supplies
The Morse Monitor Nozzle
Callahan Shut-Off Nozzle

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For Ocean and Lake Trade

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Meeting Your Requirements

That's our job. Regardless of the size or type of Marine equipment you plan to build, we can meet your requirements.

Our experienced organization and shop equipment insure workmanship that makes Manitowoc-built ships and marine equipment outstanding in marine circles.

Let us figure on your requirements.

MANITOWOC SHIPBUILDING CORP.
Manitowoc, Wisconsin

MANITOWOC

SHIPMATE RANGES

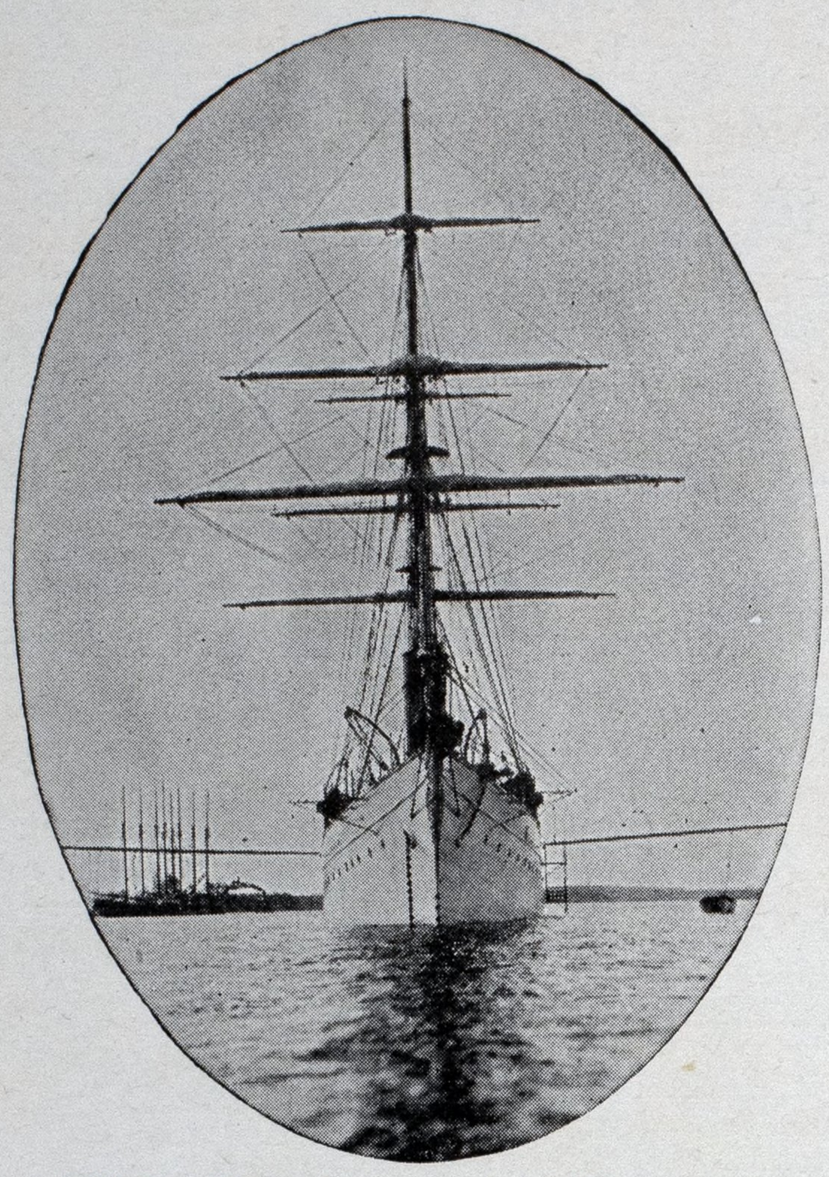
Made to burn all kinds of fuel including gas and oil

It seems almost absurd, doesn't it, to talk about sentiment in connection with cast iron; but it is a fact that after it has been made into a SHIPMATE Range we have known it to stir something akin to sentiment in a steward or cook, until he regards it with almost affection as if it were something animate.

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THE STAMFORD FOUNDRY COMPANY
Established 1830 Stamford, Conn.

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Will Always Build Good Ships



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We Solicit Your Inquiries

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BATH, MAINE, U. S. A.

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A COMPLETE handbook on modern steel ship construction. It begins with shipyard organization, and follows the work through step by step with detailed explanations and copious notes on the duties of each worker. The progress of the ship is traced from the time the first keel plate is laid, through the construction of the hull, the launching and fitting out of the propelling machinery and other equipment. Every tool used in the shipyard is written up in non-technical language which the average mechanic can easily understand. It is a complete work by a practical man dealing entirely with the practical side of shipbuilding, and will enable the ship worker to obtain a firm grasp on the things that are going on around him daily.

CONTENTS

Shipyard Organization; Division of work; Shipyard Tools; Shipways; Keels; Shell Plating; Frames; Floors; and Longitudinals; Tank Top, Inner Bottom and Peak Tanks; Stem Stern Post and Rudder; Bulkheads and Hatches; Hold Stanchions and Foundations; Deck Beams and Plating; Ship Fittings; Joiner Work; Launching; Engine Room and Engines; Boiler Room and Boilers; Propellers; Auxiliary Machinery; Piping Systems; Hull Engineering; Engine Dock Trial; Ship Nomenclature; A Glossary of Terms and Phrases.

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217 M D

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SELF UNLOADER STEAMER LOUIS RAHlow For Sale: Length 155' x 30' x 11"; 366 Gross tons, 290 net tons. In good condition. Class 90. Can be seen Oswego. Capt. A. McDonald, 71 W. Third St., Oswego, N. Y.

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FOR SALE: MARINE ENGINES AND boilers of all sizes, light draft wooden and steel tug boats for sale or charter, derrick boats, deck scows and lighters for sale or charter. Cowles' Towing Co., Ohio St., Buffalo, N. Y.

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If you want to buy or sell ships or marine equipment—need a man for your organization—make it known to the entire marine industry through the use of classified advertising in MARINE REVIEW.

Mail copy for your advertisement in the February issue today, so it reaches us before January 20.

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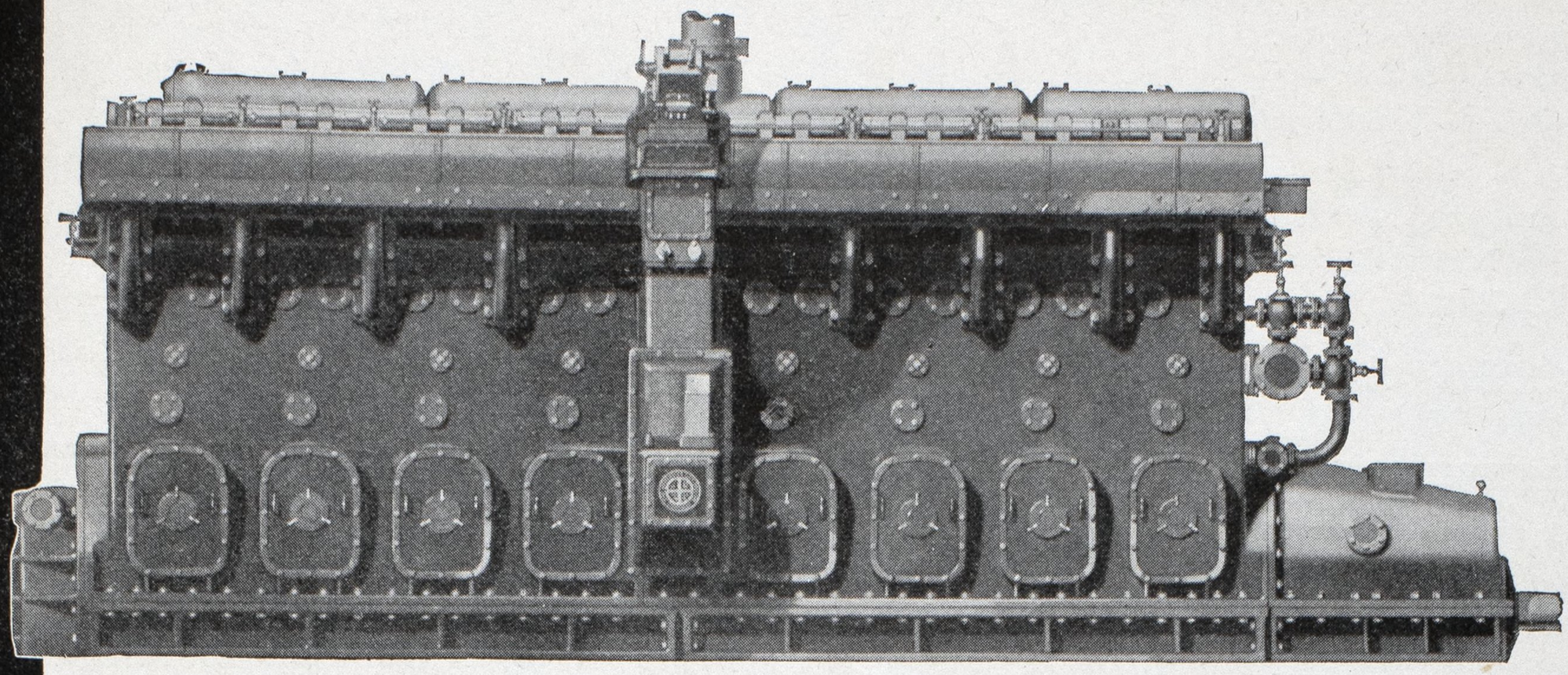
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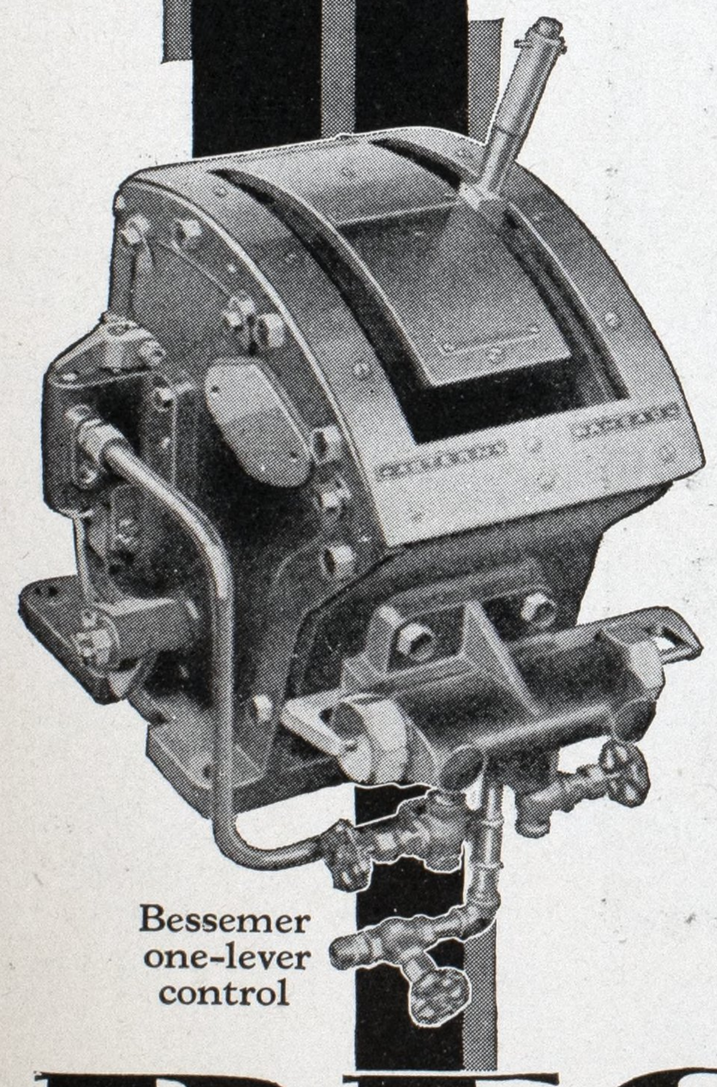


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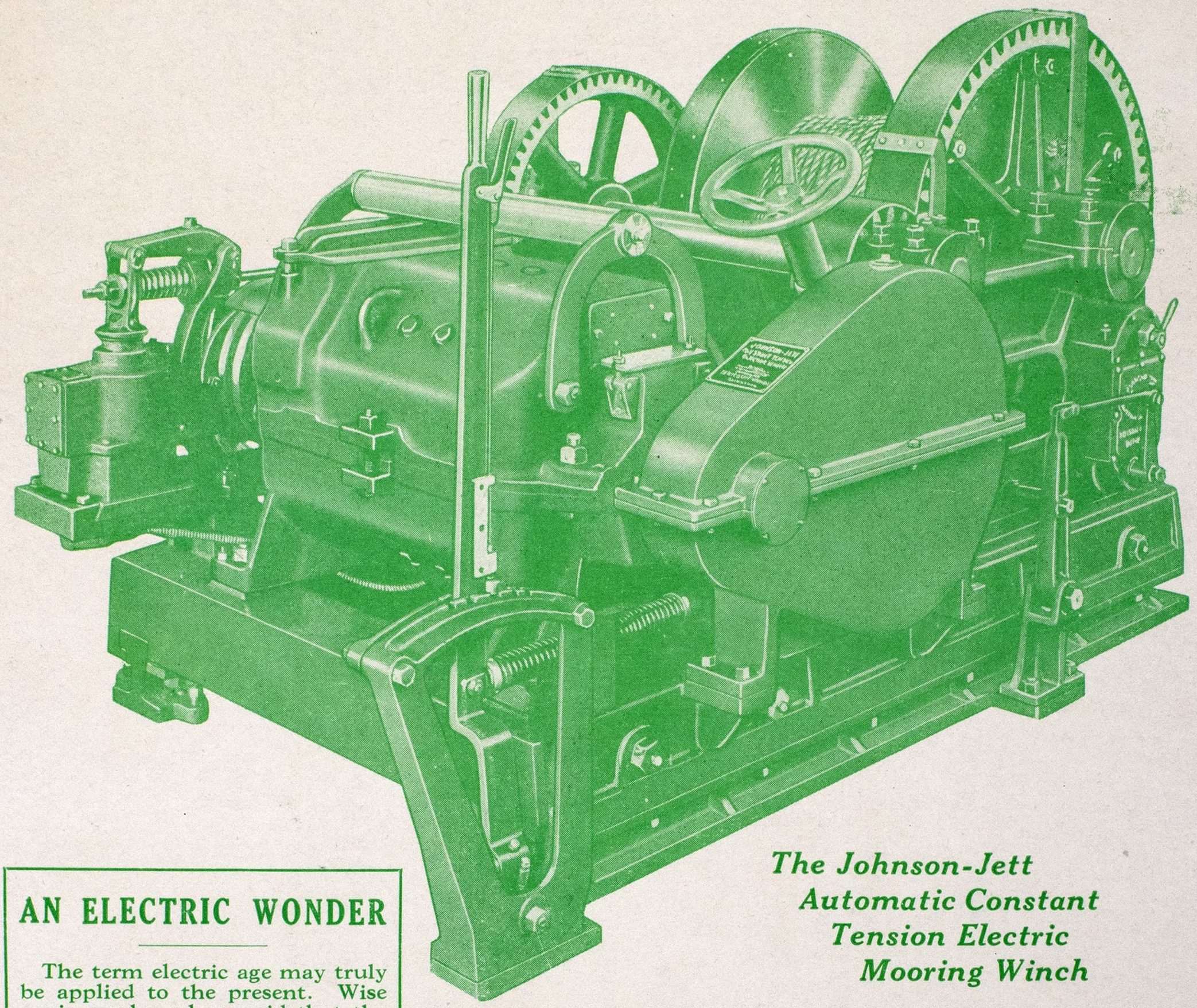
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Open mind investigation is placing this winch on new construction, and many users of steam winches contemplate replacement.

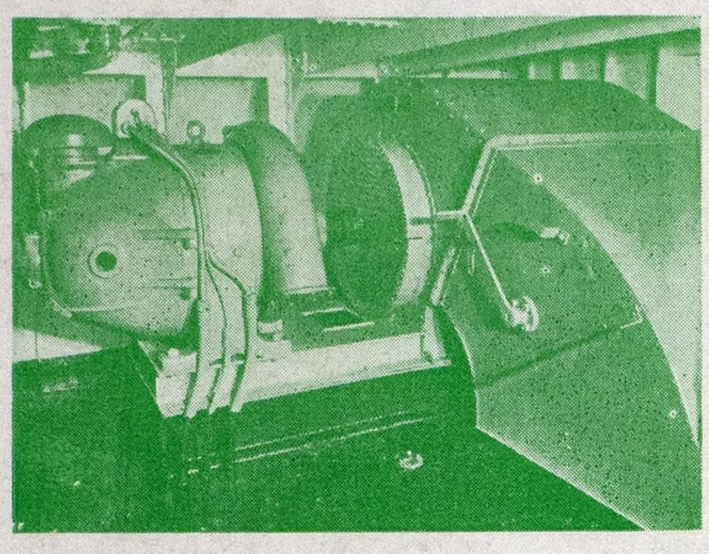
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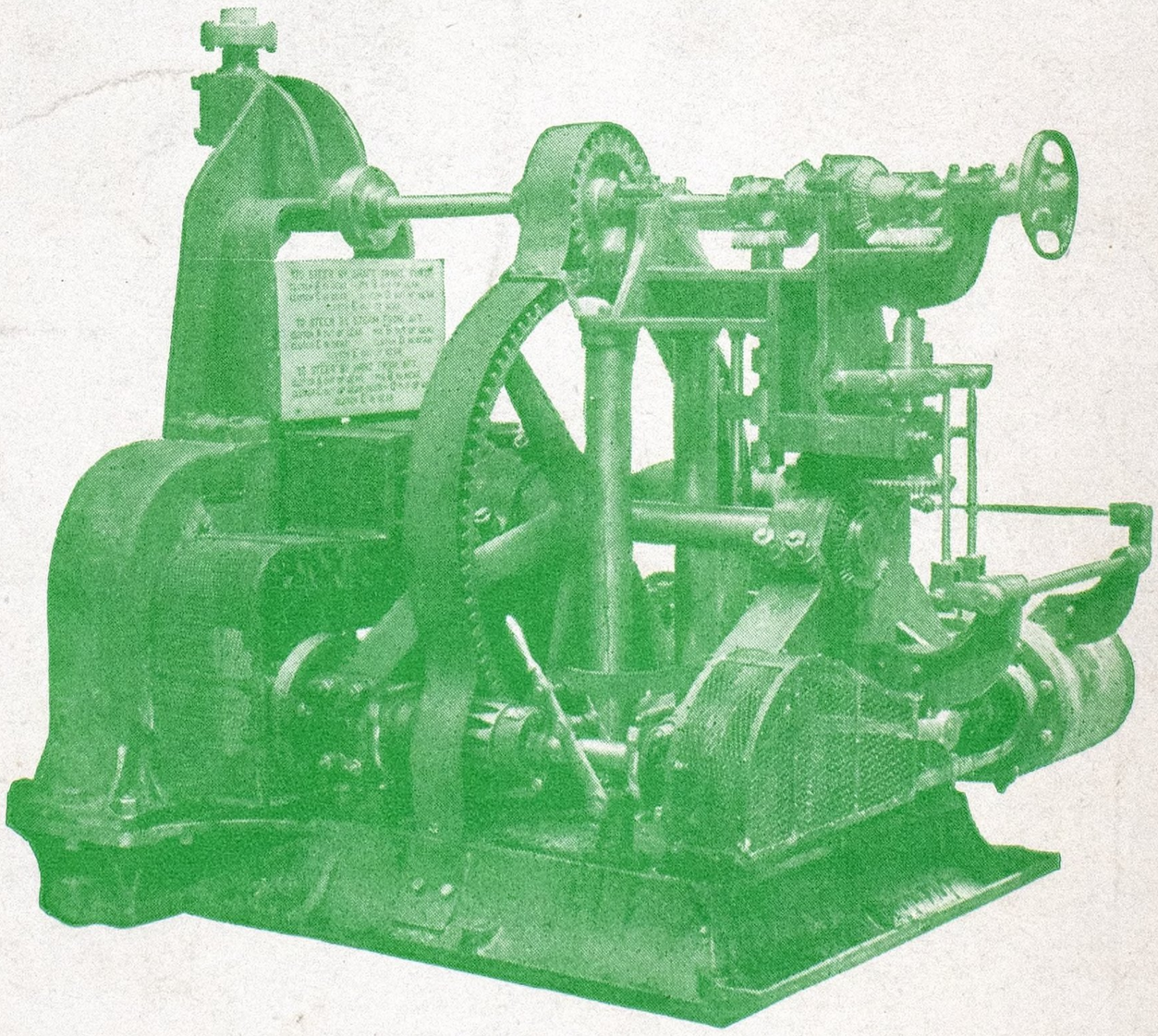
S. S. "B. F. AFFLECK" owned by Pittsburgh Steamship Co. and built by Toledo Shipbuilding Co.

S.S. "S. T. Crapo" owned by Huron Transportation Co. and built by Great Lakes Engineering Works.

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